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SEPTEMBER 1952

BUSINESS · ENGINEERING · INDUSTRY

Canada — Industrial Frontier
Special Report — Page 62

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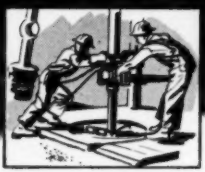

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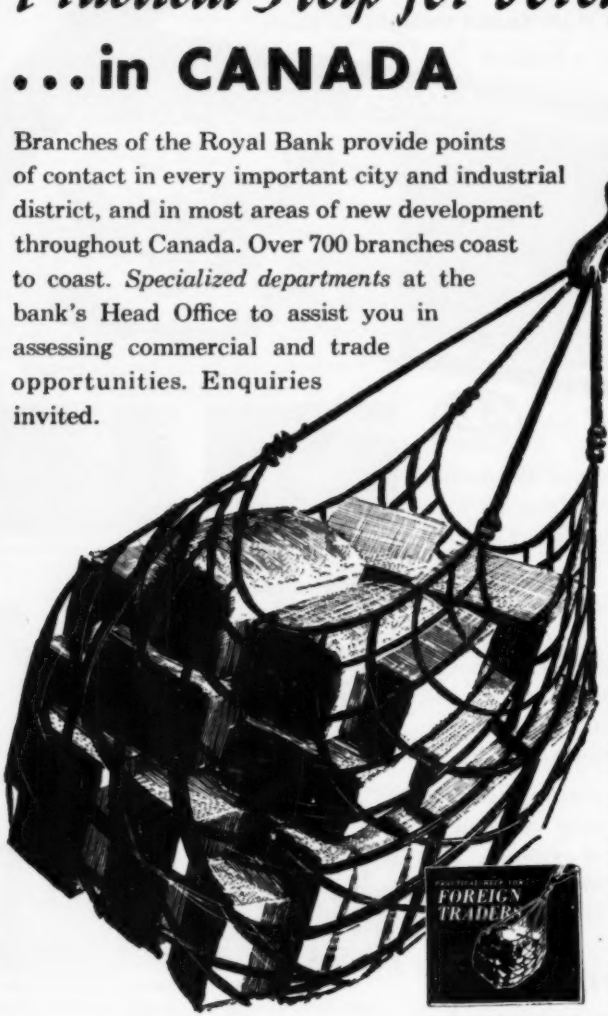

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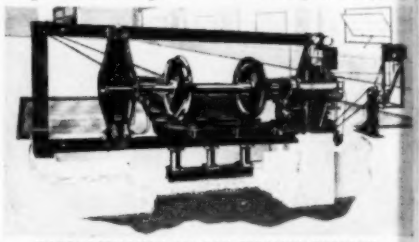

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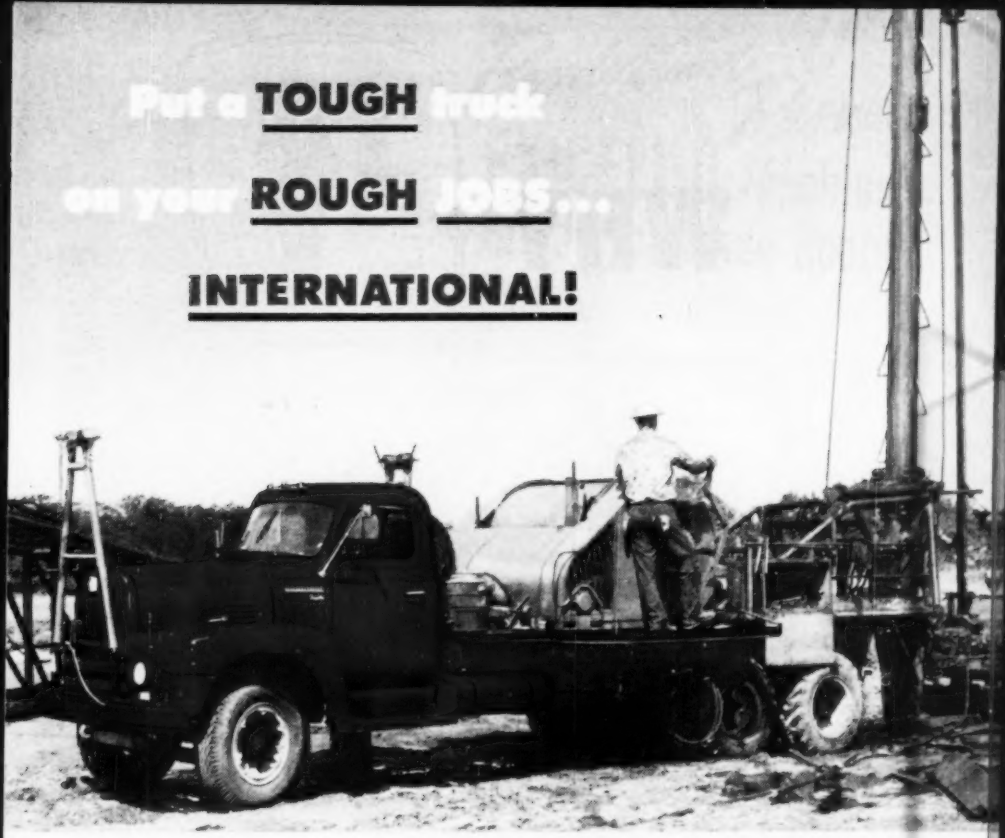

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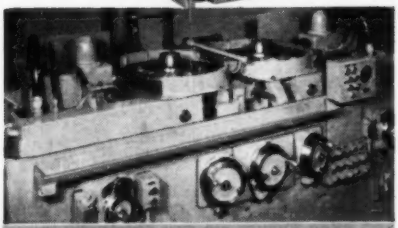
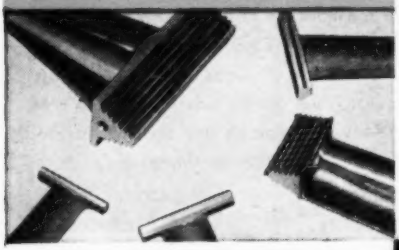


The machine uses two wheels to grind both sides of the root form simultaneously.



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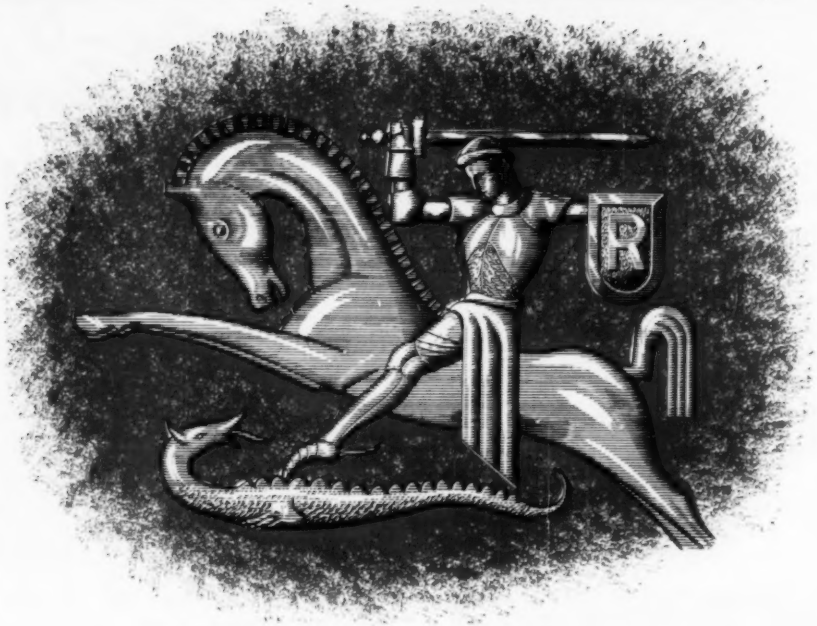

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BUSINESS TRENDS

STEEL-STRIKE EFFECTS, although the strike was settled in July, will last well into 1953. Prices of steel products are rising. Civilian steel use in the last half of this year will be at least 10% below actual use in the first half. Exports of steel products will be cut back by the same amount. Expansion programs in industries such as aluminum, electric power, petroleum, and chemicals will be carried forward 3 to 6 months.

Loss of steel production from the 55-day strike is estimated at almost 20-million tons—more than the total steel-producing capacity of Great Britain in a full year's operations. Of this, the military would have received 15%, or 3-million tons. To make up for this loss, the military's ratio will have to be increased to 30% until 6-million tons have been recovered. This will further pinch civilian steel supplies.

Here is how industrial steel users will be hurt in coming months:

Automobiles: Cold-rolled sheets and strip, essential to auto production, will be tight for 5 to 6 months. Change-over to 1953 models will be delayed. Manufacturers cannot scrap 1952 plans because they are committed for many non-steel parts that have already been produced. And higher steel prices will mean higher steel production costs.

Appliances: Inventories, which were uncomfortably high, have been wiped out. So appliance makers now are in a strong position.

Chemicals: Producers will continue to be hard hit by the stoppage of coke-oven by-product output for some time.

Railroads: Demand for freight haulage will be hard to meet because of abnormal need for rail shipment of iron ore during the winter. Normally, the steel industry builds up large stocks of iron ore during the 7 months that navigation is open on the Great Lakes.

Shipment of ore from the mines virtually stopped during the strike. And stocks were low before the strike started. So there must be heavy rail movement of iron ore—much more costly than water shipment—if the steel industry hopes to operate at capacity.

Strike will disrupt U. S. overseas trade. Some countries will earn more dollars selling steel to the U. S. Others will earn less if the lack of steel for capacity production cuts use of other metals like lead and zinc. With prices

higher, most countries will find it much harder to buy U. S. products made of steel.

RETAIL SALES are rising slowly. Textiles are coming out of the doldrums. Things look brighter too in shoes, furniture, and tires. Here is what is happening to some major imported items:

Furs: Business is exceptionally active. Retailers are busy, raw skins are moving well. Prices have been gaining—10% to 25% on wanted skins. Ban on Red imports is not hurting the fur market at all. U. S. is importing Japanese mink to make up for loss of Chinese fur.

Woolens and Worsteds: Prices are firmer abroad. Demand here is picking up, particularly in women's wear markets. In men's wear markets, competition from the "wool substitute" synthetics is not heavy—not enough around yet. But look for big gains next year.

Oriental Rugs: Last year, sales of oriental rugs, which are too costly to enjoy a volume market, were up 25% over the previous year; business should be even better this year. Main reason is use of patterns and colors recommended by American importers and geared to American tastes. Many rug makers now use pastel shades, popular in the U. S.

Rayon Staple Fiber: Demand for imported rayon staple fiber, which fell off in May and June, has picked up. The Scandinavian countries are leading in total shipments to the U. S. Upward trend in demand is expected to continue the rest of the year.

Lace: Thus far 1952 demand is running ahead of last year. Imported eyelet, val edges are moving well. New trend toward lacier outer garments should keep imports high.

Linen: Prices have leveled off. The market in Belfast is strong—propped by government contracts for 7-million yards of goods. Demand for linen clothing in the U. S. is picking up. Household linens moved well in the traditional "white sales."

CANADA is getting plenty of attention from overseas (page 62). Britain wants contracts on St. Lawrence seaway and power project. Board of Trade is setting up an information center to keep construction firms and equipment manufacturers up to date on Ottawa's plans.

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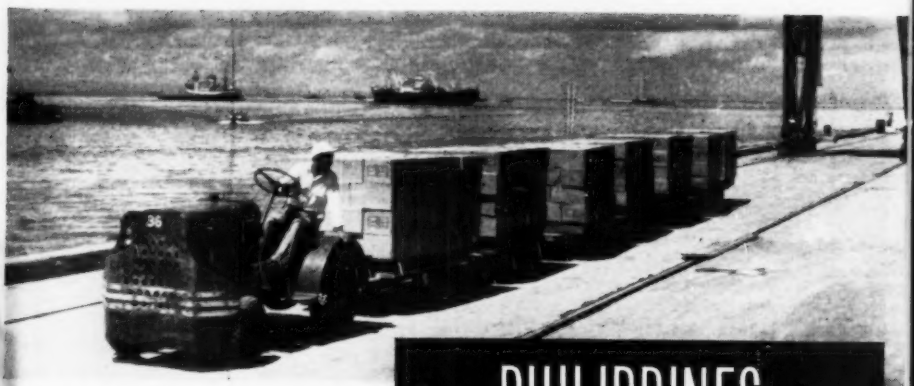

the PHILIPPINES too—

Once again the familiar cycle is in operation—in the Philippines, where increasing industrialization supplements and strengthens an economy fundamentally agricultural.

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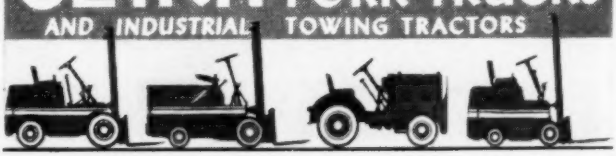

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WASHINGTON REPORT

BOLIVIA TIN SITUATION is still chaotic. Two big Bolivian tin companies, Hochschild and Aramayo, are pleading with Washington to get tough with the Bolivian government. Company officials believe that, otherwise, Bolivia will nationalize the mines without paying for them. Filing of a $6-million suit against the Patino Co. for back wages by Juan Lechin, new communist Minister of Mines, has convinced them of that.

Nationalization would cut tin output, probably by 30 to 40% within the first year. Reasons: Most of the foreign technicians now running the mines would leave or be forced out after nationalization. Bolivian mines now need heavy investment in new mining machinery if they are to maintain present output. The government has no capital to spare; private capital would be shut out by nationalization.

A drop in Bolivian output would not hurt the West much now. But it could become serious in case of war. Malayan and Indonesian supplies almost certainly would be cut off, leaving Bolivia as the principal source of supply. It too could be cut off if the mines were nationalized under a pro-communist government. Nationalization might also set off a chain reaction of expropriation in Latin America. The Chilean left-wing already is agitating for seizure of U. S.-owned copper mines.

The tin companies are scared that the U. S. Reconstruction Finance Corp. will sign a long-term contract with Bolivia without getting any assurances about the government's long-range tin policy. They want the U. S. to hold out for guarantees against nationalization and for abolition of present total government export control, which, if continued, will make profitable private operation impossible.

Whether U. S. pressure could restrain the Bolivian government now is uncertain. Lechin might listen if the U. S. made such demands. The tin companies think he would. But they think only a tough U. S. Policy would hold him back from nationalizing now.

NEW CONCEPT of U. S. foreign economic policy is fast taking shape in the minds of an influential group of government technicians. Key feature of the present blueprint is a $7-billion to $10-billion currency stabilization fund to be administered by an Atlantic Joint Management Board. The board would consist of representatives of the U. S., Britain, and continental Western

Europe. The continental seat would be held open until Western Europe was unified enough to appoint a common representative.

The board would set common policies on trade, investment in underdeveloped areas, internal monetary policies, and stabilization and expansion of raw-materials markets. Its objective would be to close the dollar gap automatically at a high level of trade without U. S. foreign aid. The faster this was done, the less drain there would be on the stabilization fund—most of which would be put up by the U. S.

The planners hope to get their program into legislative form in time for the new administration to pick it up and take it to Congress. They think this kind of a new program would have a better chance of Congress support than piecemeal legislation designed to bring U. S. foreign payments into balance.

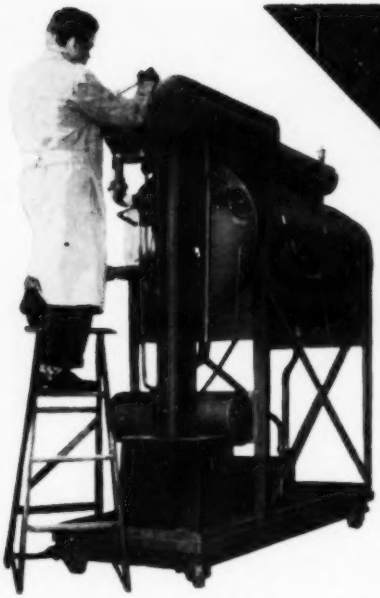
U. S.-BRITISH BID to settle the Iranian oil crisis may crop up soon. It may take the form of declaring an open-door policy on Iranian oil sales. This would permit Iran to sell some oil to independent oil companies and help stave off complete economic collapse during negotiations for a long-term contract with the British.

Fear of a communist coup is prodding London and Washington to try again for an oil deal. Many U. S. officials think this is the last hope of keeping Iran out of Stalin's grip.

Mossadegh is stronger, on the surface, than ever before. But he owes his new strength to the support of the fanatical right-wing religious leader, Kashani. The communists are backing Kashani, and he apparently is willing to cooperate with them. He is as anti-Western as they are. He has been agitating for forcing all westerners out of the country.

Kashani may unseat Mossadegh. Then the communists would be one step from power. Kashani would expel the Westerners, but he could not solve Iran's economic crisis. Once the West was out, rising popular unrest would make Iran an easy target for the communists.

It may be too late already for Mossadegh to make an oil deal. He has hinted at a deal a couple of times since his return to power, backed down a few hours later. He may already be too scared of Kashani to risk making concessions to the West.



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Effective lighting is vital to this modern appliance showroom in Cuba. General Electric's many years of lighting research have resulted in quality products that help customers *see* more . . . and help you *sell* more.

Your G-E representative can show you how to use G-E lighting experience to make your store more attractive . . . move more goods. Ask him for the FREE booklet:

"Three A's of Store Lighting"

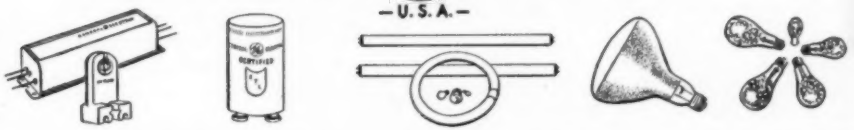
Or write International General Electric Co., Lamp & Lighting Div., 570 Lexington Ave., N.Y. 22, N.Y., U.S.A.

FL-52-2

You Can Put Your Confidence In—

GENERAL ELECTRIC

—U. S. A.—



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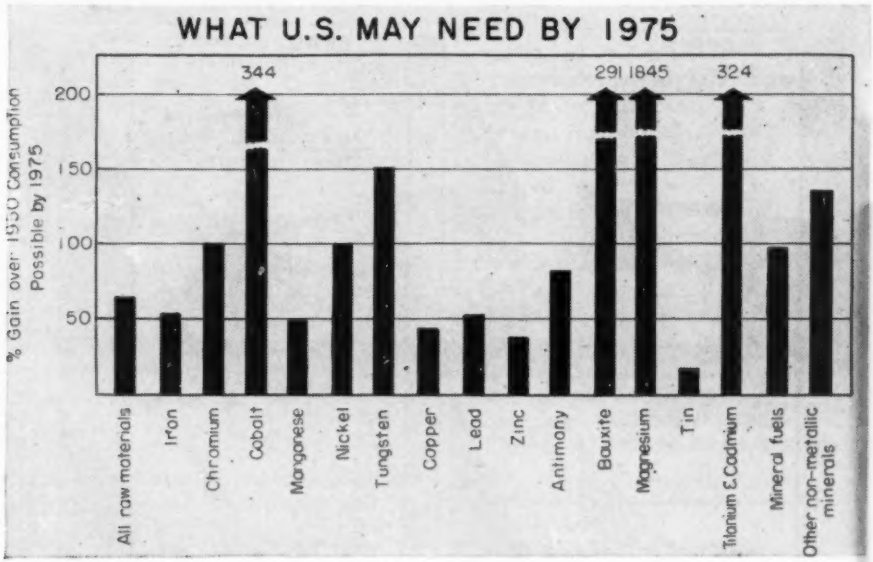


Materials: U. S. Must Import

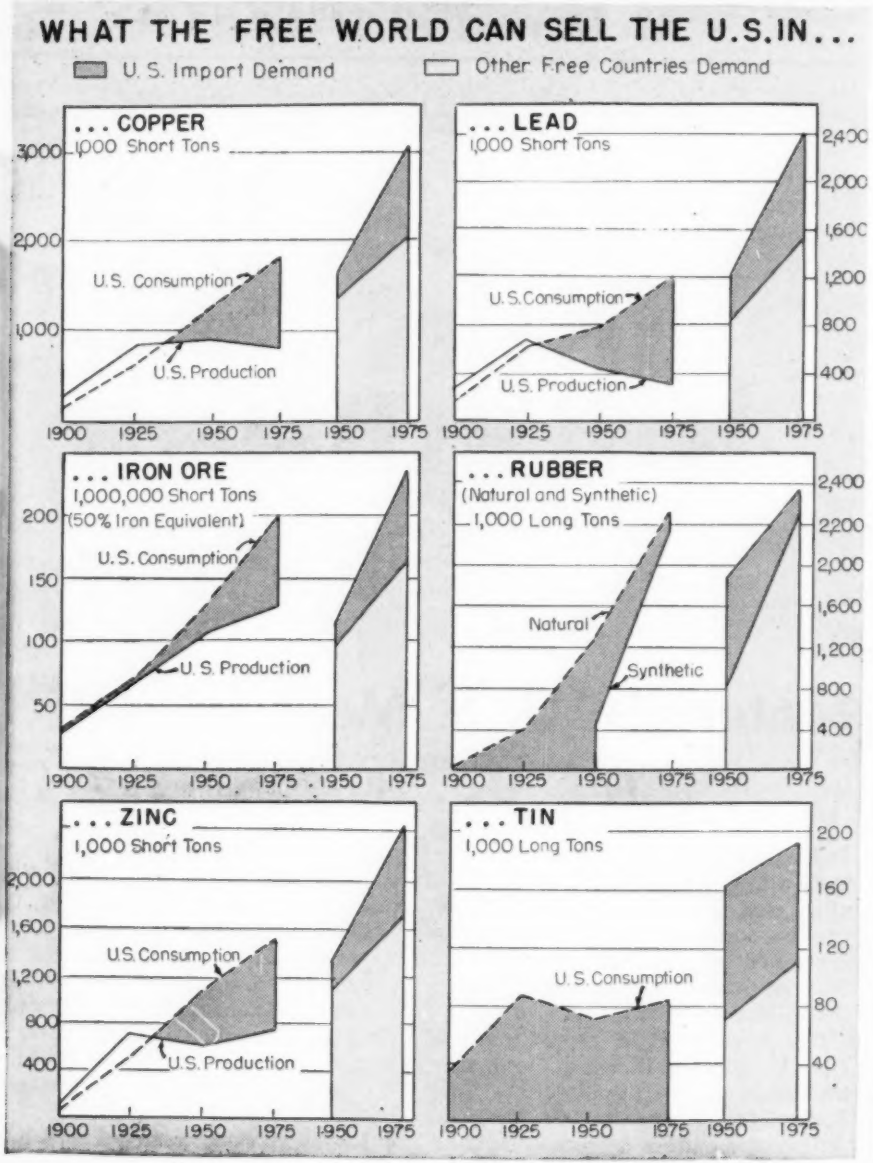
Prospect of permanent raw-material shortages in U. S. means U. S. will have to meet most of its needs from foreign sources

DOLLARS are on the way to help plug the dollar gap which is plaguing U. S. allies and threatening the unity of the free world. That is the good news contained in the recent report of the Materials Policy Commission. (McG-H Digest, Aug, p9 and 13).

The so-called Paley report predicts that U. S. overall demand for raw materials will be up 50 to 60% and demand for minerals up 90% by 1975. A big part of this increased demand will have to be filled from foreign sources (see chart on p 20). That means more dollars abroad.

The chances are the world will not have to wait 10 or 15 years for the payoff. Rising U. S.—and Western European—demand for raw materials can be filled only if there is heavy and rapid capital investment in foreign production of primary products.

Most of this investment will have


WHAT THE FREE WORLD CAN SELL THE U.S. IN...
U.S. Import Demand
Other Free Countries Demand
... COPPER
1,000 Short Tons
3,000
2,000
1,000
U.S. Consumption
U.S. Production
1900 1925 1950 1975 1950 1975
... LEAD
1,000 Short Tons
2,400
2,000
1,600
1,200
800
400
U.S. Consumption
U.S. Production
1900 1925 1950 1975 1950 1975
... IRON ORE
1,000,000 Short Tons
(50% Iron Equivalent)
200
150
100
50
U.S. Consumption
U.S. Production
1900 1925 1950 1975 1950 1975
... RUBBER
(Natural and Synthetic)
1,000 Long Tons
2,400
2,200
2,000
1,600
1,200
800
400
Natural
Synthetic
1900 1925 1950 1975 1950 1975
... ZINC
1,000 Short Tons
2,000
1,600
1,200
800
400
U.S. Consumption
U.S. Production
1900 1925 1950 1975 1950 1975
... TIN
1,000 Long Tons
200
160
120
80
40
U.S. Consumption
1900 1925 1950 1975 1950 1975

to be in U. S. dollars. Foreign nations no longer have the capital.

The Paley report almost certainly will speed the flow of American private capital into foreign raw-materials development. It will underline the need and potential demand for foreign raw materials. It probably will lead to modifications of U. S. Government policy designed to encourage private American investment abroad.

No Shelf for Paley Report

Washington observers are pretty sure the Paley report will not be shelved. The administration already is following it up vigorously. Truman has set up a special task force of representatives of all interested government agencies to study ways of converting the recommendations of the report into legislation. Administration economists hope the following changes will be made in U. S. policy within the next few years, as recommended by the report:

- Tariffs will be slashed or scrapped on imports of materials in which the U. S. is not self-sufficient. Manganese, tungsten, copper, mercury, bauxite are some of the probable minerals for which tariff protection might be reduced.
- The U. S. stockpiling program probably will be extended indefinitely. Government stockpilers will be permitted to sign long-term contracts at guaranteed prices for a period beyond 1962.
- U. S. mining tax laws will be revised to encourage investment in foreign mines. Investors in foreign mines now have to pay either the U. S. or the foreign tax, whichever is the higher. This frequently puts them at a disadvantage in competition with investors of other countries. U. S. investors also may be permitted to defer reports on income until it is actually received, to file consolidated returns with foreign subsidiaries, to treat dividends from stocks in foreign companies as capital return instead of income.
- Washington will expand its program of guarantees to overseas American investments.
- The U. S. Government will study ways of reducing the instability of world raw-materials markets through international agreements.

Concrete action to reduce market instability through international agreement probably will be longer in coming than the other policy modifications. This is an extremely controversial field. Even the Paley report did not make specific recommendations.

But it scored short term instability of raw-materials markets as a major bar to expansion of world raw-materials production. Sharp short term price swings discourage investment, hold down production rates of existing mines, make governments afraid of permitting development.

Stabilizing Materials Markets

The report suggested that the U. S. should study three main ways of stabilizing raw materials markets:

1. Multilateral international contracts like the International Wheat Agreement could be set up. This sets minimum import and export quotas at minimum and maximum prices for each signatory country.
2. International buffer stocks could

cushion short-term price swings. These would be administered by international boards on which both exporters and importers would be represented.

3. Buffer stocks plus quotas are suggested. These would be most useful for materials for which long-run trends were uncertain like natural rubber and tin.

Agreements like these would be hard to work out in practice. It is difficult to get consumer and producer governments to get together on common policy for the operation of such agreements.

There are plenty of other problems that will have to be ironed out too if the opportunities for expanded raw materials sales to the U. S. are to be realized.

A greater degree of currency convertibility will have to be achieved. Otherwise repatriation of U. S. investors' profits will be uncertain, investors will balk at sending their money abroad. This problem will be partially self-liquidating to the extent that foreign resources developed by U. S. capital are sold in dollar markets. And an expanded program of government guarantees for overseas investments would help some.

Dollar Fear Another Hurdle

Reluctance of many foreign governments to let in private American capital will be another hurdle to development of world raw materials resources. This must be overcome by diplomacy and international cooperation.

The rest of the free world also will be competing with the U. S. for available raw materials. Overall free world demand for primary products excluding the U. S. is expected to increase more than 60% by 1975. The U. S. will be consuming a smaller proportional share of world resources than now. That means a big slice of new raw materials production will not be earning dollars.

Uneconomic Industrialization

Primary producing countries also are bound to work increasingly towards self-sufficiency as they achieve greater political autonomy. They will seek to diversify their economies by uneconomic industrialization behind tariff walls and therefore use more of their raw materials.

This trend towards uneconomic autarchy could put a brake on free world economic expansion as a whole. It can be halted only by developing world resources within a political framework which protects the long term interests of the backward primary producing countries as well as those of the industrialized consuming nations.

The Paley report does not underrate the difficulty of these problems. But it does hold out solid hope that they will be attacked energetically and systematically by the U. S. government.

To help you understand the effect rising U. S. consumption of raw materials along with depletion of U. S. reserves will have on the free world's economy, the Digest has assembled key sections of President Truman's Materials Policy Commission report. For your free copy, write the Editor, McGraw-Hill Digest, 330 West 42nd Street, New York 36, N. Y., U.S.A.

SHOPPING BY CAR remade grocery-buying habits, helped lead to supermarkets

Supermarket: New Revolution

The supermarket has changed the food-retailing business. Can its influence be extended to the other forms of retail selling

ALMOST 20 YEARS AGO, the first supermarkets opened shop. In the comparatively brief time since, the supermarket has created a major revolution in distribution. It has:

• Strengthened the independent and saved him from being driven out of business by chain stores.

***SELF SERVICE** enables the super markets to undersell counter stores*

***CHOICE** of goods in modern supermarket is impressive; boosts impulse buying*

***EFFICIENCY** and bigger output per sales person come from dividing work*

***PREPACKAGING** in the store is a big cost-cutter; rounds out self service*

- Changed people's buying habits.
- Branched out from food into a long list of non-food goods.
- Forced other retailers to adopt supermarket methods.

The supermarket, having come of age, is now entering a second period of growth. This will continue some of the major trends already at work. But it differs so far in one important respect. Other things beside price bring people into the supermarket today—such things as convenience, sleek decor, wide selection of foods, parking space, lunch counters, air conditioning.

For the time being at least, the price revolution of the supermarket is over. Eventually the supermarket may find ways to lower prices again. Meanwhile, it looks as though the creative energy of the supermarket

will take a different direction—increasing the number of food supermarkets, pushing the supermarket into new non-food lines, and expanding its influence into other fields of retailing.

Low Prices Draw Customers

Price was the first basic appeal of the supermarket. It still is, in the sense that consumers are fully aware, without thinking of it, that the supermarket can undersell any service grocery store.

The thing the consumer forgets is that it is his own efforts that have achieved the supermarket's lower prices. The customer assembles his own order, thus saving a clerk's time. Besides getting the customer to do his own work, the supermarket has largely passed off such services as delivery and credit.

Other characteristics, too, help the supermarket keep its prices down:

- Low ratio of rent to sales because of big volume.
- Division of labor (stockboys, checkers, packers, etc.), which makes for greater efficiency.
- High productivity per sales person. Even though supermarkets employ a lot more people than the old grocery store, they get a much bigger sales volume per person.
- Large average orders.

Today's supermarkets are expensive plants. Many of them have air-conditioning, arrangements for delivering packages to cars, music, rest rooms, bakeries, luncheon counters. All of them have yards of refrigerated cabinets for frozen foods and meats; elaborate, sometimes mechanized checkout counters; belt conveyors; intercom systems.

Americans not only buy more food at one time when they shop, but they buy more and better food than they used to. This, of course, is due in part to prosperity. But supermarket people think that they had a big hand in starting the trend.

"The supermarket," says the vice-president of Food Fair, "has traded up peoples' food buying habits."

It has done this, first, by lowering the cost of food, and thereby enabling people to buy more of it.

Secondly, it has put more brands and sizes of more foods in convenient form and closer to the consumer's fingertips.

Impulse buying plays a very important role in food purchasing. Only a third of all purchases are planned down to the specific item before the customer enters the store. Another quarter of the purchases are only planned in a general way. The remainder of the purchases do not enter the customer's mind until he or she goes into the store.

The supermarket operator exploits the impulse to buy in every possible way—by grouping products, such as picnic foods; by playing up the appeal of massed foods; by using color and lights.

Super Changes Selling

The supermarket has had a resounding impact on manufacturers. In the super, nobody stands between the customer and the food. That fact has created a whole revolution in selling.

In general this new situation has

What Is a Supermarket?

su'per* mar'ket, n. A departmental, usually self-service, retail market of a chain-store system or an independent selling foods and other household merchandise to an annual gross of at least $100,000, often leasing certain departments to concessionaires.—Webster's New International Dictionary

A supermarket is a departmentalized retail establishment having four basic food departments—self-service grocery, meat, produce, and dairy—and other departments, doing a total sales minimum of $375,000 annually.—Super Market Merchandising

A supermarket is a complete, departmentalized food store with a minimum sales volume of $500,000 a year and at least the grocery department fully self-service.—Super Market Institute.

given the advertised brands an advantage over the less well known brands. The reason for this is that the consumer is already "presold" on certain products by advertising before she gets to the store.

Packaging has succumbed to the new selling techniques. It has undergone a complete face-lifting. The super is generally recognized to have had greater effect on packaging than anything else has in 25 years. The trend is toward informative copy. The screaming poster-style design is on the way out. In its place are more color and pictures of the product.

Supers Add Non-Foods

The most explosive thing that has happened to supers in recent years is the widespread addition of non-foods. Grocers have been anxious to get into non-foods for one very good reason: margins are better.

The biggest non-food item in food stores by volume is cigarettes. Drug-store items rank second.

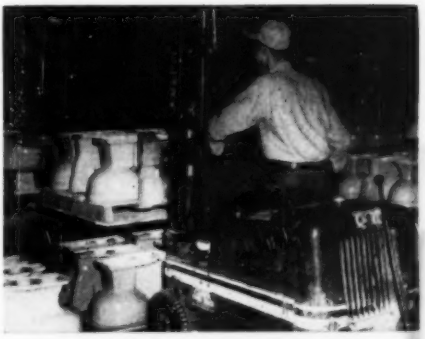
The supermarket has left its mark on still other forms of retailing. Several big department stores have created complete self-service departments.

But in general, department-store people are taking a different approach to self service. They think in terms of what they call preselection. The idea is to let the customer get at the goods freely and make a preliminary decision. At the point that he or she needs assistance—about sizes, say—the clerk steps in.

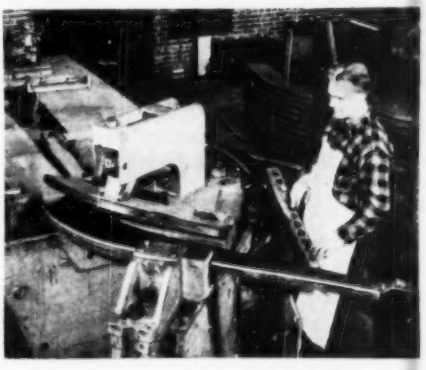
In the short-range future, the supermarket has some very real problems to thrash out. Increasing expenses, the upward drift of margins, more and more competition from new supermarkets, and decreasing efficiency—all these problems and still others worry supermarket operators today.

Some think mechanized handling of goods will help. Others are trying to push as fast as they can toward complete self service. This means increasing prepacking of meats and produce right in the store.—Business Wk, June 28, p38

This Month's How To . . .

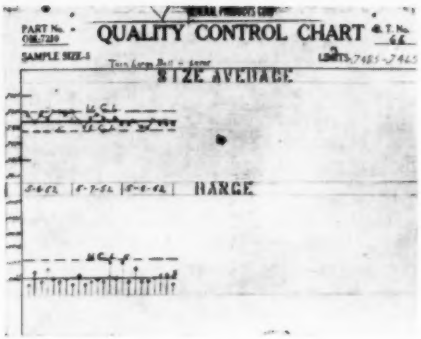


. . . handle uncrated ware is a good example of how palletizing can cut individual ware handlings by 50%. Before adopting pallets, Abingdon Potteries, Inc., followed usual hand handling methods—four handlings of each fired piece between firing and inspection. Ware now moves directly from kiln car to pallet and is then speedily moved to storage by lift truck. Second move is to inspection. Abingdon is one of first in the industry to use pallets for handling uncrated, fired ware.—Ceramic Ind, July, p82



. . . make big bends is shown on a No. 4 Pines machine at John Deere Spreader Works of Deere & Co. The part is the curved boom on tractor loading attachment. Stock is 0.112-in. steel blanked and formed to U-shaped taper. Two channels are arc-welded together to form a single boom piece. Articulated mandrel, made up of rectangular sections, supports boom from inside during bending. Hold-down shoe presses on work and sliding pressure die holds boom against bending form as it rotates to make the bend.—Am Mach, June 23, p108

. . . identify stock in inventory is easy with color. C. W. Farmer Co., Macon, Ga., paints stock-bin faces in contrasting color. Different colors distinguish products and thus reduce errors in order filling. The faces of the bins holding iron fittings or correlated items are painted silver; yellow paint indicates brass. Stock in the warehouse is binned either vertically or horizontally. All lengths or sizes of the same item are in line. Identification is easy, and size desired is quickly located by reading either vertically or horizontally.—Ind Dist, July, p130



QUALITY-CONTROL chart hung at machine is paper covered with acetate sheet on which inspection results are plotted

AUTOMOTIVE PARTS are typical of those on which General Products Corp. has established statistical quality control

Small-Shop Quality Control

Large mass-production plants use quality control, but small shops can too as this small contract machine shop proved

SYSTEMATIC COLLECTION and graphic recording of dimensional data—that is statistical quality control. But don't think that it is practical only for large plants.

Small plants too can make it work. Three years experience with it at General Products Co. (180 workers) established these advantages:

1. Rejects reduced.
2. Faulty machines spotted.
3. Quality level raised.
4. Teamwork among tool setters, operators, and inspectors improved.
5. Operators no longer blamed for poor quality work when the machine, not the man, is at fault.
6. Personal judgment in inspection replaced by fair, inelastic mathematical standards.
7. Customer relationship improved.
8. Quality of products certified to customers.

When quality control was installed, detailed explanations of the plan were made to foremen, inspectors, and operators. Then the toughest job in the shop was picked as the first product to control.

This job was the facing operation on a gear-shift lever arm (above left—center). Rejects had been running from 8 to 10%.

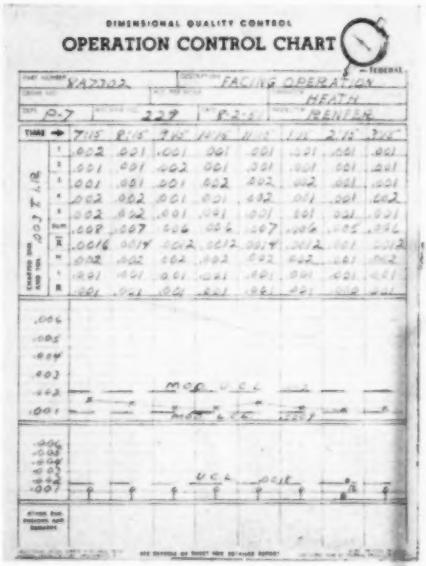
Careful study over a period of 5 weeks showed that several machine adjustments had to be made. The spindle was reinforced, tool grind was changed, and other minor adjustments were made. Rejects dropped to 1%.

Quality control was next extended to the slotting operation on the arm and in the next 3 years to most of the practical operations in the shop. Now under quality control are form-tool turning, single-point turning, boring, slot milling, facing, and heat treating.

Control chart is drawn on 18x24-in. stiff paper and covered with transparent acetate. Each hour, an inspector makes five readings at the machine and records the data on both the chart at the machine and the permanent record (upper right). Average of the five readings is plotted with cellophane marking pencil on the operator's chart.

The control chart has space enough for plotting a week's operation. At the end of the week, the chart is erased and started again.

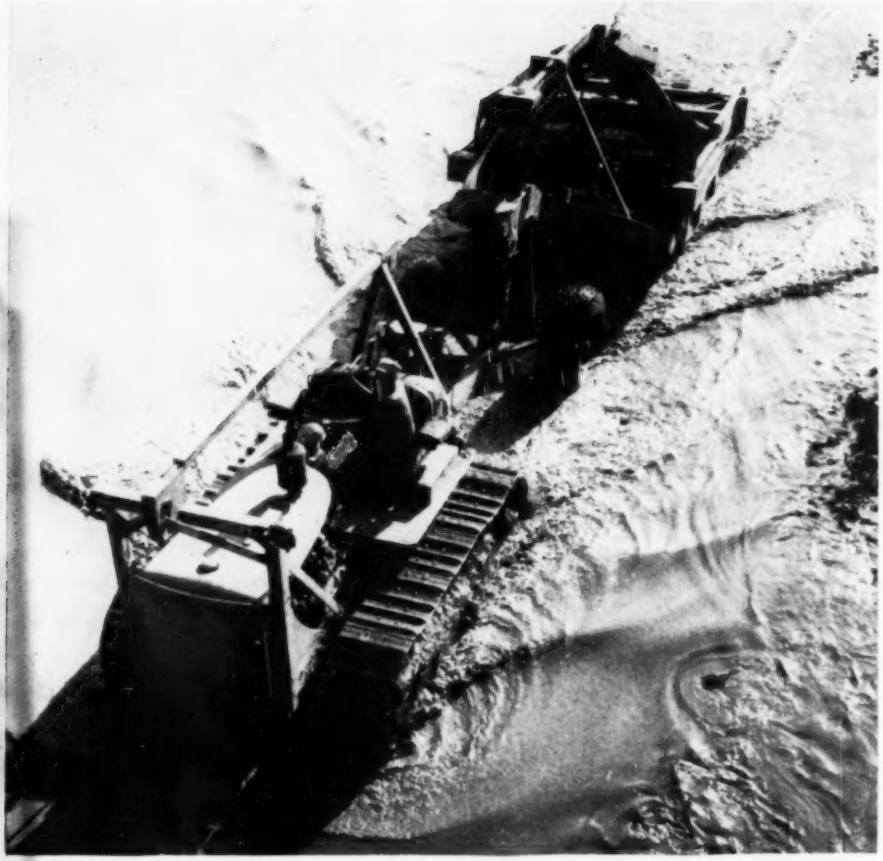
Permanent records are filed by the chief inspector for future reference. Notations indicate major changes in machine or tooling setup that changed the accuracy of the job.

The nature of the operation is taken into account in establishing control limits. On the gear-shift operating handle, which has a steel ball on one end, rejects were high before adoption of quality control. Intermittent cutting is necessary and when the tool dulled, pressures increased, causing springback and off dimensions.

***PERMANENT RECORD** of job performance is recorded numerically and charted on operational control chart kept by chief inspector*

Under quality control, rejects were cut by more than 5% to under 1½%. At least half the rejects are oversize and can be reworked.

What has quality control done to inspection work? Inspection costs have been reduced only slightly, but inspection efficiency is much higher. All heat-treated parts are still inspected 100% to insure dimensional accuracy.

General Products believes that the greatest single benefit from quality control has been its ability to certify its products. At present, 34 different parts are certified to one customer, who omits 80% of the usual inspection.—Iron Age, June 19, p143



FORDING a river deep in Korea, this U. S. Army soldier-operator knows he is operating the best equipment available. It has been thoroughly tested and proved by the U. S. Army

How U. S. Army Tests Equipment

CAPABLE operators, mechanics and engineers take all types of construction equipment and test them at Fort Belvoir, Va. The rugged tests work out bugs, uncover deficiencies, suggest modifications or design changes —or reject the rig entirely. And everybody benefits—manufacturer, distributor, taxpayer, and user.—Const Meth & Equip, July, p94

Equipment Gets Tough Tests; Some Are Wrecked in Process

LOAD TRANSFER tests on truck crane are performed with increasing weights in box.

PORTABLE ROLLER takes pounding on a crosscountry mobility test behind truck.

MAXIMUM permissible force exerted at blade tip of motor grader is recorded.

TRENCHER plows ditch for pipeline in one pass. It is hauled by an angle-dozer.

ALL-WHEEL-STEER grader fills trench in one pass behind trencher.

"FLYING CRANE" IS READY FOR TRIALS

World's largest known helicopter, the Hughes XH-17, is shown after rollout. Now complete, including tailboom with anti-torque rotor, the XH-17 will undergo tie-down trials before flight. Two General Electric turbojets feed thrust through the rotor shaft and out along the 100-ft. dia. blades to tips.—Aviation Wk, June 9, p9

Refining Metals Chemically May Halve Production Costs

Chemical refining may cut in half the cost of producing such metals as copper, nickel, and cobalt. The new process eliminates roasting, smelting, electrolytic and fire refining.

Chemical Construction Corp. and Chemetals Corp. developed the process. Three new plants will use it—Sherritt Gordon Mines, Ltd., in Canada, National Lead Co. in Missouri, and Howe Sound Mining Co. in Utah.

The process consists of pressure leaching, with ammonia or acid, of unroasted sulfide ore concentrates, an almost simultaneous oxidation step, and then direct reduction from aqueous solution of copper, nickel, and cobalt as pure metallic powders. Reactions take place in big steel autoclaves lined with acid brick. Autoclaves are agitated.

Process advantages, besides lower production costs, are lower transportation costs, fewer operating personnel, and less time lag between production of concentrates and metal recovery. Reduced costs will permit mining of low-grade ores thus far economically unattractive.—Chem Eng, June, p164

Chocolate Made Faster

Continuous, one-step operation at Paul Beich Co. makes fine chocolate from roasted cacao beans. Result: several grindings and three lengthy batch refining operations normally employed are avoided. Advantages: 80% saving in floor space, manpower needs cut from 11 to 2 men, less power used.

Roasted beans, after passing through a cracker-fanner, are pulverized in a Mikro-Atomizer to a fineness that permits its incorporation directly into liquid ingredients. From the pulverizer, the powdered chocolate is carried by air flotation through a cyclone collector. Particles escaping cyclone separation go to a dust collector.

Pulverized ingredients then pass to Stehling tanks in which they are mixed with liquids such as whole milk and vegetable oils.—Food Eng, July, p62

Planning Fills Jobs Right

Advancement program eliminates major layoffs, reduces shortages of needed skills, gives workers a chance at jobs they prefer

SINCE Hotpoint, Inc., started its planned-advancement program 2 years ago, it has had no major layoffs. But there have been serious production cutbacks caused by materials allocations.

It is a major management problem to maintain a work force in which fluctuations from materials shortages, changed schedules, or seasonal demand are kept to a minimum. So Hotpoint inaugurated its four-step program of planned employee development. Its goal was to provide a stable, yet flexible and steadily improving work force.

Step 1. Forecast Employment Requirements—Hotpoint figures how many employees will be needed on a quarterly basis. Each quarter, a definite production schedule is set for the next quarter and schedules for the following four quarters as well are estimated. Estimates are based on sales forecasts, future orders, and materials allocations.

Transposing this schedule into employment requirements is the next job. Hotpoint knows the man-hours needed to manufacture each product. So it multiplies the number of units to be built by the standard hours needed to build each and adds the figures up. Then the grand total is divided by the number of working hours in a quarter. Result: the number of employees required.

As an illustration, let's assume that materials allocations will cut production in the next 3 months. That means Hotpoint will need fewer workers.

By adding up three sets of predictions —normal turnover, losses to military services, and retirements—Hotpoint has a good idea of how many employees it can expect to lose each quarter.

Now the company can determine whether turnover will reduce its work force enough to match reduced production needs. For illustrative purposes, let's assume it will not. Does that mean Hotpoint calls a layoff?

Here is where the plan pays off. Hotpoint has ample warning and can make adjustments to avoid the necessity of laying anyone off. In the hypothetical case, for example, Hotpoint knows that materials allocations will ease up within the quarter. So it could arrange for the excess workers to do needed maintenance work within their division, on a temporary basis.

If the lower production schedule looks like a long-term affair, permanent transfers to other divisions may be made. In any event, time to do something is ample.

Actually, turnover has more than taken care of any decrease needed in the work force. To date, the main value of the program has been to tell how many employees to recruit.

Step 2: Inventory Worker Skills, Aptitudes, and Job Preferences—Inventorying employees is done by a combination of questionnaire and personal interview.

Questionnaires were sent to all hourly rated and salaried employees below the management level when the program started. New employees get theirs soon after they start work.

The questionnaire includes space for personal history information and job-preference information. The employee lists three preferences from a list of the available jobs at Hotpoint. And he has to explain why he feels qualified.

All the information is put on IBM

cards, classified by present skills and potential skills. For simplification, all of Hotpoint's jobs are broken down into 35 basic skill types.

Each employee's planned-advancement questionnaire is reviewed with him twice a year in personal interviews. Hotpoint generally tries to give every employee as much help and guidance as he wants or needs.

Step 3: Train and Guide Workers—Hotpoint set up specific training programs whenever expansion is scheduled or when periodic checks of skill inventory reveal a short supply of needed skill. The number of workers to be trained are keyed to the estimates of present and future needs. In-plant courses are given on company time.

Step 4: Advance on a Planned Basis—The IBM catalog serves as a central requisitioning system for all departments.

When a skill shortage appears, the IBM system sorts the cards of all men who are qualified or potentially qualified.

Those that are qualified are interviewed. Hotpoint makes sure they want the transfer; if they do, they go right to work. If more men are needed, the "potentially qualified" are interviewed. How much on-the-job-training necessary to qualify them is determined. A program is set up and the selected men go right into the program.—Factory, July, p90

It's Simple To Get . . .

. . . the business and technical information needed to carry on modern industry efficiently and profitably. This month, as every month, you will find the information offered free in "Production Ideas from Manufacturers' Catalogs". Turn to page 77, fill in the coupon with the numbers of the catalogs you want, send it to us, and we'll ask the manufacturers to send the catalogs directly to you. Why not do it now?

Paint-Can Ring Overseal Wins Postal Approval

U. S. Postoffice Dept. rules that conventional paint-can lids must be soldered to the top of the can at several points. This eliminates the possibility of accidental opening and leakage in transit.

Sears, Roebuck & Co., large mail-order house, found that individual soldering was a costly, time-consuming operation. So it helped develop a ring overseal that won postoffice approval.

The new seal is applied to the tops of the cans by a small, easily operated closing machine. The tamper-proof overseal, extending over the lip of the regular friction-plug top of the can, is quickly clinched down over the top edge. It is impossible to remove the can closure without first taking off the seal.

The overseal is designed with a breakaway tearstrip that facilitates removal when the can is to be opened. The seal, scored at two points, is easily broken when the tear tab is grasped with a pair of pliers. The seal is removed and the pry-off lid taken off in the usual way.—Mod Packaging, May, p116

May Simplify Avionics

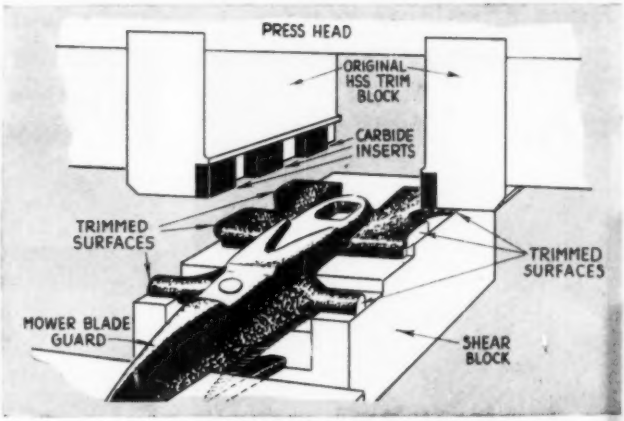
The U. S. Navy's Bureau of Ships may have the answer to the problem of how to keep growing quantities of complex electronic equipment in operating condition. The answer is called "Circuit Standardization and Unitization."

A competent technical group would investigate all types of complex electronic systems to determine a minimum number of basic electronic circuits. These circuits would be standardized and published in a handbook.

To design an electronic system, the designer would turn to this standard circuit handbook and piece together his

INSERTS TRIM CASTINGS

Tungsten carbide inserts in trim blocks increase tool life about nine times at Oliver Corp. Blocks trim flash from steel castings. Original high-speed-steel trim block was ground away to make room for the inserts. Cutting edges do not chip under impact. — Factory, July, p118



system using basic circuits that most closely meet his needs. Each of the standardized circuits would be available as an off-the-shelf package from one or more different manufacturers. The circuit would come as a plug-in-type unit.—Aviation Wk, June 30, p39

Swiss Machine-Tool Exports

Big problem in Switzerland is to apportion its production of metal goods, particularly machine tools, to all the outside buyers that want them. Machine exports last year reached an all-time high of 1,281-million francs, and the high level of activity is continuing this year.

The machine-tool industry is flooded with orders. Exports jumped from 123-million francs in 1950 to 166-million in 1951. Major share of 30-million went to Britain, with the U. S. a close second at 26½-million, Germany third at 19-million, and France fourth at 17½-million.

Exports this year, particularly to Britain, are still higher. At the first-quarter rate, they could mount to 50-million francs for the year.—Mach, July 5, p1045

Modern Plow Mold Boards Press-Formed to Shape

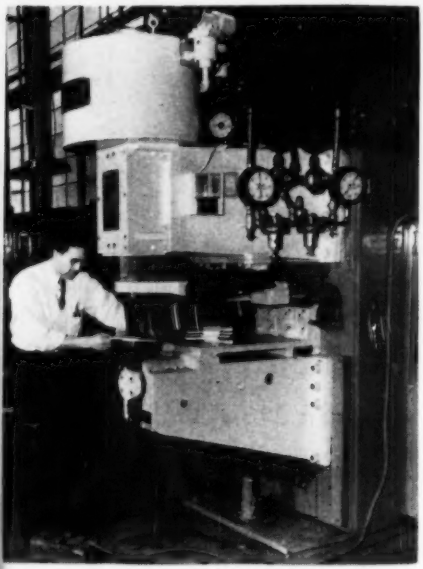
Latest development in long-life plow design is one having a laminiated mold board made from rolled plate consisting of two outer layers of C-1078 high-carbon steel and core of C-1025 low-carbon steel. International Harvester Co. makes the mold boards by hot press-forming.

Mounting holes are pierced in the blank in a crank press. Face side of blank is swabbed with muriatic acid so scale formed in furnace rises easily from the surface.

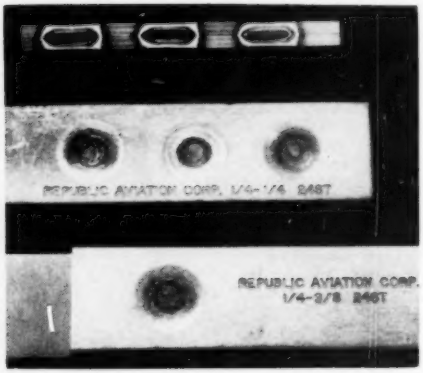
Blank is heated to 1650° F. in a rotary-hearth furnace, removed from furnace, and passed over a series of wire brushes to scrape off scale. It is then pressed to shape—in a 150-ton Elmes press for smaller blanks or a 200-ton Hydraulic Press unit for larger blanks.

Formed blank, still hot, is quenched in 50° F. brine for 6 sec. Quenched board is placed between slotted dies in an adjacent hydraulic press and flushed with water until cooled to room temperature. —Am Mach, June 9, p123

Huge Aluminum Welder . . .



. . . Spot-Welds Like This



High-Strength Alloys Welded

WHAT IS SAID to be the world's biggest spot welder is now in operation at Republic Aviation Corp. Its job is to join high-strength aluminum alloys in combinations of thicknesses up to ¼ to ⅜ in. Welding of these thicknesses is regarded as a record achievement.

On wing skins, the welder is averaging more than 80 spot welds per min. And on internal structures not subject to aerodynamic stresses, it has made up to 100 spots per min.

The illustration shows typical specimens. At top is a cross-section of the interior of three ¼-in. welds. At center is a top view of welds of the same size, while the bottom shows a ¼-in. to ⅜-in. shear-test specimen in 24ST aluminum alloy.

The new welder is a three-phase, frequency-converter machine. As purchased, it had a specified capacity of $\frac{3}{16}$ in. to $\frac{3}{16}$ in. Bigger and better air regulators and pressure gages plus refinements in other equipment and in techniques have increased this capacity to the present ¼ in. to ⅜ in.

Quality of welds made are uniformly high. Welds joining two ¼-in. thicknesses have withstood loads of 10,500 lb. per spot, while welds of ¼-in. to ⅜-in. thicknesses have withstood 14,000 lb. per spot.

The rate at which the machine operates—80 spots a min.—far outclasses the highest reported riveting rate of 15 per min., and even that rate was made by automatic riveting. Chief drawback to riveting is the multiple operation required—hole drilling, countersinking or dimpling, rivet insertion, bucking, and driving.

Present plans at Republic call for the spot welder to replace even bolting to some extent. Like riveting, bolting is slow and expensive, and it weakens the

structure by removing metal when holes are drilled. Although this loss in strength was not too important in past, slower airplanes, it has gained added significance with the advent of high-speed aircraft, which are subject to unprecedented aerodynamic stresses.—Weld Eng, July, p35

New Jobs for Spiral Wraps

Spiral wrapping is moving into new fields of application. A number of "straight-length" products ranging from carpet-sweeper handles to rugs and metal moldings are now being spiral-wrapped. Some advantages are:

1. It is the cheapest package for some type of products.

2. The glued type of wrap eliminates unwinding.

3. Spiral wraps need little storage space in the packager's plant and can easily be disposed of by the receiver of the finished package. A rip string permits quick and easy removal of the wrap from the product.

4. Internal movement of the product and possible damage is practically eliminated.—Mod Packaging, June, p105

New Mica Promises Improved Armature-Winding Insulation

Mica mat insulation, developed by General Electric Co., promises to raise voltage strength, flexibility, and power-factor range of electrical insulation quality of high-voltage armature coils.

This type of insulation has other advantages: more uniform thickness, more uniform bond content, more uniform filling, less mica void, greater availability, better flexibility for application, better controlled manufacturing process.

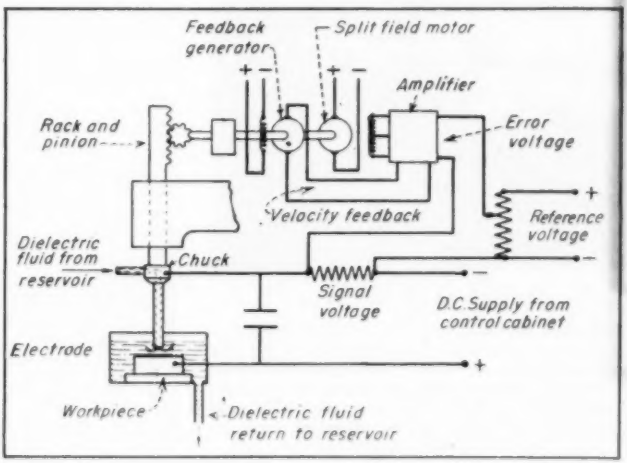
The Mica-mat bond is a modified polyester resin. While it was developed especially for mica mat, it can be used too in flake-mica tape insulation.

Voltage strength of mica mat insulation is 50% higher than that for conventional asphalt-bonded flake-mica insulation. Its low power factor indicates a low void content and a low dielectric loss in bonding and insulation material.

Mica-mat insulation is now made on a pilot-plant basis. Commercial production is expected soon.—Power, July, p80

SPARK MACHINING IN BRITAIN

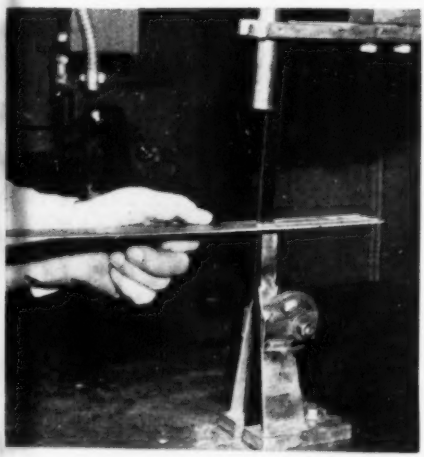
Electro-spark machining is shaping metallic parts in dielectric fluid by spark discharge of controlled intensity and duration. Machine developed by Sparcatron Ltd., England, has servo system to maintain spark-gap length. Error voltage is zero when electrode is in right position. Otherwise, error voltage is fed to amplifier; its output energizes field of motor that then positions electrode correctly.—Mach, June 28, p977



TECHNICAL SHORTS

High-voltage Transmission—Best economy is attained on transmission lines by (1) alternately increasing conductor size and voltage class as power requirements increase and then (2) operating at highest permissible voltage. Further cost advantage is that all reactive kwa. needed at receiving end can be obtained from switched capacitors.—Elec West, June, p106

Backs Up Welds—When welds are made from one side only and smooth welds are wanted on the other side, a backing material is needed on the under side. Elliott Co. has found that glass tape, of the same basic analysis as submerged-arc welding flux, works satisfactorily. Besides, it is easy to handle.—Weld Eng, June, p36



BOX-STRAPPING SAW

Toothless sawblade, made of ordinary steel box strapping by Solar Aircraft Co., is saving money on sawing stainless-steel and high-alloy sheets. Regular band-saw blades cost $3 while strapping to make one blade costs 10¢. Blades have lasted as long as 29 hr.—Iron Age, June 5, p97

Quartz Paper—U. S. Naval Research Laboratory has developed a synthetic quartz paper superior to asbestos as electrical insulation material. Paper can withstand temperatures to 3000°F. and has low electrical losses at high frequencies. It contains no boron.—Prod Eng, July, p187

Increases Kiln Capacity—Flash drying of calcium carbonate has increased capacity of rotary kiln in pulp plant of Chesapeake Corp. of Virginia. Basic operation is recovery of quicklime from calcium carbonate sludge. Kiln now calcines only, instead of drying and calcining.—Chem Eng, May, p266

Lip Beads Bite Better—New method of hardsurfacing reduces wear on lip of 35-yd. dipper at Sinclair Coal Co. Underside of lip is reinforced with 16 parallel beads of Lincoln Electric Co.'s Faceweld No. 12. Spaces between beads fill up with excavated material, and wear is reduced.—Coal Age, July, p144

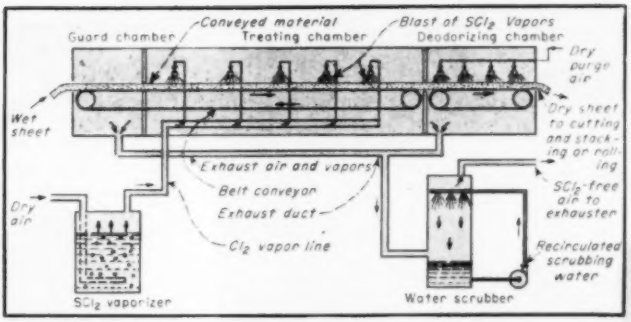
Jacquard Weaves in Saran—Wiry quality of saran plus static that saran generates have been overcome. Now saran can be woven on Jacquard looms in floral, abstract or geometric patterns. Most probable use is in upholstery material.—Mod Plastics, July, p84

Rocket Carries Line—Washington Water Power Co. shoots lead lines across ravines by launching a rocket from a bazooka-like tube. Bazooka has shield to protect worker and a pistol grip. Pulling trigger fires missile. Accuracy is good.—Elec World, June 30, p86

Glass Lubricates Extrusions—Babcock & Wilcox Co. has placed in operation first extrusion press in America to use Ugine-Sejournet process. Glass, applied in form of spun-glass mats, melts in contact with hot steel billet, prevents seizing, and insulates tools from heat of billet.—Am Mach, June 23, p141

DRIES COATINGS

Chem-Dry process dries protective and decorative coatings of ink, paint, or varnish in seconds. Dry vapors of sulphur dichloride, generated by passing low-pressure air through dichloride liquid, are sprayed onto coated material. Meyercord Co. developed process.—Chem Eng, June, p249



Lost-circulation Cure—Shell Oil Co., in drilling some oil wells, ran into formation cracks that drank drilling mud as fast as it was pumped in. Cable tools were tried but proved too slow. So Shell switched back to rotary rigs and substituted compressed air for drilling mud. That ended the trouble.—Oil & Gas J, May 19, p85

New in Interoffice Communications—Mechanically operated interoffice communications system at Dun & Bradstreet dispatches messages without conventional pneumatic-tube carriers. Tickets, folded at the end to form a small "sail", serve as their own carriers. International Standard Trading Corp. supplied the system.—Am Business, June, p24

Far-infrared Baking—Replacing infrared heat sources in baking oven with far-infrared heaters reduces breakage of television picture tubes during baking of interior graphite coating. The glass absorbs far-infrared energy, which speeds up baking, whereas it transmits most near-infrared radiation. — Electronics, July, p246

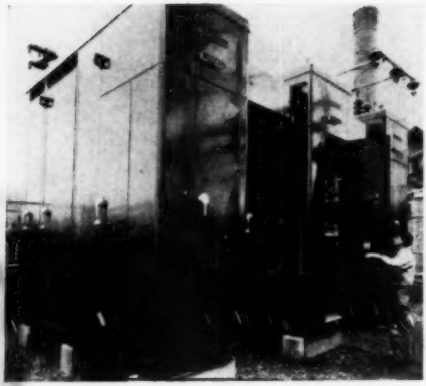
Cool Your Roof—Uninsulated black asphalt roof will reach 150° F. (and heating the space underneath, of course) under the same sun that raises a sprayed roof to only 100° F. Spraying a roof with water also saves roof as volatile oils vaporize less and there is no thermal shock from sudden storms.—Power, June, p118

Fast Maintenance—Ease of maintenance designed into the Willys-Overland Corp. 4-wheel-drive jeep allowed three soldier-mechanics to remove complete engine power package in 3 min. 20 sec. Ease of maintenance is being extended to other U. S. Army vehicles, such as trucks up to 5 tons, tanks, tractors, graders, cranes, and shovels.—Const Meth & Equip, July, p100

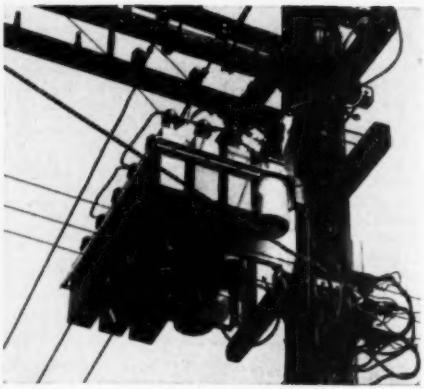
Foams Dunnage—Miles Kimball Co., mail-order house, foams its own dunnage from a special phenolic resin mix. Postage and time are saved. Breakage is reduced. Foam is molded into slabs that are placed in package; items to be shipped are imbedded in foam.—Mod Packaging, May, p204

Tire for High Speeds—B. F. Goodrich Co. is testing a new automobile tire for sustained speeds of over 100 mph. Tire is similar to current low-pressure, cushion-type tires. Adhesion between tread and carcass is improved. Special reinforcement reduces flexing.—Auto Ind, June 15, p19

Extracts Citrus Juice—Revolutionary type of juice extractor will soon be in pilot operation. The machine, made by Air Line Engrg. Corp., halves fruit, dejuices it by vacuum, derags peel, separates flavedo from albedo, and steam-cleans vacuum cups returning to pick up more juice. The juice does not come into contact with air at any time in the cycle.—Food Eng, July, p176



METAL-ENCLOSED throat-connected bank consists of three steps switched by voltage control



POLE-MOUNTED, factory-assembled switched capacitor is installed on distribution circuit

Switched-Capacitor Control

- Capacitor switching is steadily increasing in U. S. plants
- Its effectiveness depends on the type of control specified
- Discussed here are method's types, advantages, limitations

IN THE LAST 20 YEARS, capacity of installed capacitors on utility and industrial circuits has climbed from 0.01 to 0.25 kvar. per kw. and is expected to reach 0.5 in the next 15 years.

Currently, great emphasis is placed on switched capacitors. Installations of switched shunt capacitors range from 230-volt distribution circuits to 115-kv. transmission circuits and can be connected directly to 230-kv. transmission lines.

Effectiveness of capacitor switching depends on the control. Most common types of control are those based on voltage. Contact-making voltmeter-type of voltage-regulating relay initiates the switching operation. A time delay in the control circuit prevents excessive operation of the switching equipment.

Applicable to feeder circuits is an inexpensive voltage control that mounts a voltage relay and auxiliary close-trip relay in a single case. Voltage sensitive element is an induction disk contact-making voltmeter. This control is suitable for single-step capacitor installations.

Large single-step and all multi-step installations require solenoid-operated, balanced-beam, contact-making voltmeter relays. These are of two types, alike in having the moving contact attached to the balanced beam but differing in means to adjust compounding and band width.

When it is desired to operate a bus at two different voltages, a time switch can be employed to change the voltage setting. This is done by incorporating

a resistor in series with the voltage-relay operating coil for the higher voltage setting. Time switching of capacitors can control reactive generation.

On regulated feeders, voltage is not a satisfactory signal for capacitor switching. If a single capacitor is to be added to the feeder during heavy loads, current control can be used.

Often a large intermittent load requires a single bank of capacitors that must be automatically connected and disconnected with the load. In this case, current control can switch the bank when the current supplied to the load exceeds a given value.

When kvar. is to be kept low to reduce system losses and voltage drop and to release generating and transmission capacity, more than one switched capacitor step is generally used. Capacitors are switched to keep kvar. within specified limits when it is a given value.

Power factor is not a satisfactory means of controlling switched capacitors. A desensitizing device is required to avoid pumping at light load if the number of steps is kept reasonable.

When capacitors and regulators are used on the same bus, capacitor voltage steps should be kept as large as possible to reduce number of breaker operations. If capacitors are located on a regulated bus, time-switch or kvar. control is preferable to voltage as a signal for switching capacitors and current control.—Elec World, June 16, p120

New Battery Designs for Portable Radios

Alkaline dry-cell batteries will be used as B batteries in personal portable radios manufactured by Radio Corp. of America and Emerson Radio & Phonograph Corp.

Design of the flat cell, made by Ray-O-Vac Co., centers about use of sodium hydroxide electrolyte with zinc anode and a manganese dioxide mixture for the cathode material. As the battery is used, the electrolyte becomes absorbed gradually.

Rating of radio battery is 500 ma.-hr. with ability to stand up under 15-ma. current drain. Adding mercuric oxide to the electrolyte gives a heavy-drain battery for other purposes.

The alkaline battery is similar to the P. R. Mallory Co.'s mercury cell (McG-H Digest, Feb'51, p44). Mercury cells have longer shelf life because there is little or no cell reaction until electrical energy is drawn from the cell.

Carbon-zinc batteries for portable radios are being revamped by National Carbon Co. The B battery will be flat, and the new cylindrical A battery will be twice as long as the conventional 1½-volt cell.—Electronics, July, p10

ART IN PORCELAIN ENAMEL

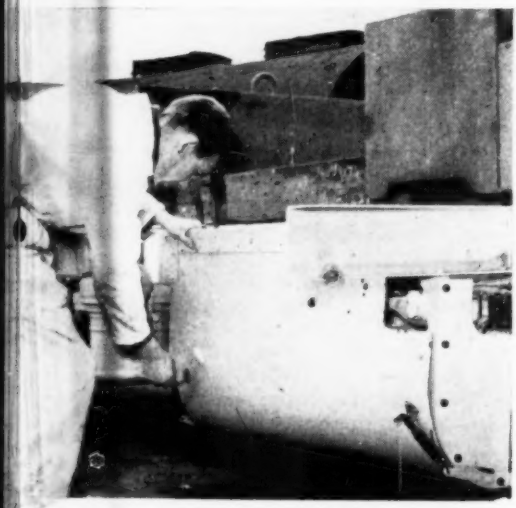
Well known artist in porcelain enamel, H. Edward Winter of Cleveland, has added custom fireplaces and murals to his product list. Here enamel panels cover brick work to change fireplace to sophisticated, yet not too formal, unit. Zebra-striped bowl is another Winter product.—Ceramic Ind, July, p58

Air-Pollution Problem Solved by Catalyst Brick

Some plants can solve their air-pollution problem and make a profit if they are exhausting combustible hydrocarbon gases, vapor, or solids, and if they install a bank of Houdry catalysts.

The basic unit of the new combustion catalyst is a simple brick with 73 porcelain rods. Each rod has a coating of catalytic alumina and platinum alloy. This coating completely oxidizes combustibles even at temperatures well below their normal burning points. And it generates enough heat to fire boilers and heat plant processes.

The catalyst will burn industrial solvents, resins, organic dyes, varnishes and lacquers, oil fumes, smoke, and other waste products that are pouring out of industrial stacks. It should pay its way, too, anywhere that unburned fuel is going up the flue.—Factory, July, p124



QUIETER BUS RIDES . . .

. . . are promised for Britons as a result of sound insulator that insulates engine noise in Leland Motors, Ltd.'s Royal Tiger Buses. Material is aluminum sheet lined with linoleum. It shrouds engine to prevent noise from striking road and echoing up along side of bus.—Prod Eng, June, p190

Mexico Welds Longest Span

The longest welded span ever erected, 328 ft., has been completed for Mexico City's municipal auditorium. Eight rigid frame trussses will be assembled into a spectacular fan-shaped framework. Towering 120 ft., these trusses span from 295 to 328 ft.

The rigid frames are box trusses supported at the base by 9½-in. nickel steel pins fitted into a welded clevis built up of 2¾-in. plate. Subsections were prefabricated on the site and erected with 130-ft. gin poles and a truck crane. Sections were up to 70 ft. long weighing from 9 to 15 tons.

Frame columns and knee sections were put up first. Horizontal frame sections were then raised and welded into place. Macomber de Mexico, S. A., was contractor.—Const Meth & Equip, June, p48

Coating Extends Pump Life

Pump wear and maintenance were excessive at Calumet Hecla Consolidated Copper Co. So the company tried liquid Neoprene as a lining material for the pumps.

A severely cavitated pump was selected for a trial. First the pump shell was sand-blasted clean. Cavitations were then filled with Neoprene putty and the shell given six successive brush coats of Neoprene until there was a uniform coat about 0.06 in. thick. The entire assembly was cured.

Now the pump has operated for a year without service. Formerly, cavities had to be filled monthly by welding.—Eng & Min J, July, p93

***PARALLEL-TANDEM OPERATION** provides one answer to deep overburden, while increased power permits new units to enter the stripping field*

10 Ways to . . .

Boost Coal-Mining Profits

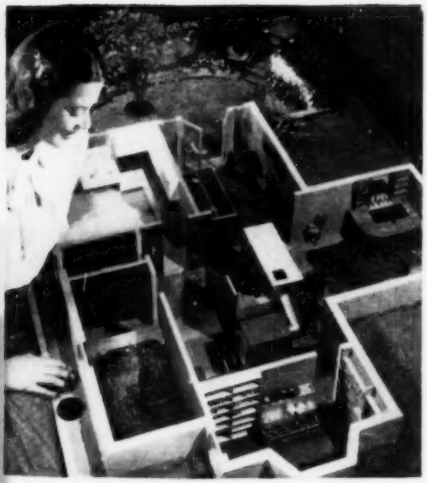
Integrating marketing, mining and preparation provides the maximum in return on investment in modern mining properties

NET INCOME from a business enterprise should be at least 10% of gross after all expense items are taken into account. It could well be the goal in design for modern coal mining. Here are 10 ways that can help get that 10%:

1. Analyzing the Market—A successful mining operation needs a good market—or potential market. Freight rates and quality, in addition to price and competition from other mines and fuels, are practical factors in determining the outlets for a mine already in existence. They also are factors in opening a new mine.

At the moment, and likely for some time to come, the main outlets for coal are electric utilities, by-product coking, and general industrial use, with domestic and railroads following. Major new markets for coal are still only possibilities, though some are verging on the probable. Complete conversion of coal to high-Btu. gas or liquid fuel still is quite a distance away. But partial conversion by distillation, using the solid residue as a power-plant fuel and the by-products as chemical raw materials or liquid fuels, is relatively close.

2. Designing for the Market—Design and redesign should be keyed to a down-to-earth sales figure. Investment, equip-



WINNING CUSTOMERS for better coal could be done with this model coal-heated home

GOOD MAINTEANCE needs a clean, well lit and well equipped shop

ment and operation, as a result, are more directly related to the tonnage that can be moved, thereby creating a more favorable climate for profitable operation. If the market is always placed first, the groundwork for high efficiency is laid. Thereafter, it is relatively easy to add to working facilities when there is definite evidence that demand has increased or can be increased.

3. Building the Market—Sales, service and research are the three main roads to making the most of market potential. These must be backed up by cost and quality.

One of the mine operator's key responsibilities is making sure that his sales representation is the best that can be obtained. Good selling is most effective when it is backed up by good service. This means an organization that can show the user how to get the most out of coal, and how to solve the problems connected with its use. Service also promotes the design and application of equipment that will burn coal both economically and efficiently.

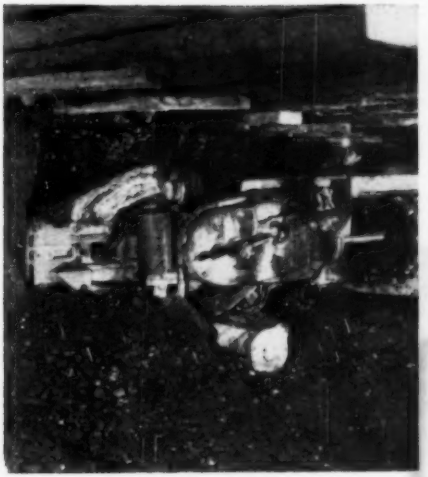
Research to hold present markets and build new ones is vital. Not all coal companies can maintain separate research facilities, but they can support industry programs.

4. Investing for Profit—For maximum returns in efficiency, quality and safety, the modern mine should have enough money spent on it to get these results—and no more. And management must be ready to supplement the initial investment with new outlays when developments in equipment and methods show that those outlays will pay off.

5. Providing Effective Manpower—Men, both management and miners, fix the ultimate results. The goal is picking the best men possible, training them as necessary in their jobs, and then making it as easy as possible, through modern facilities and modern methods, for them to do their jobs efficiently.

6. Mechanizing for Efficiency—Effic-

EFFECTIVE MACHINES make pitch mining safe for miner and productive for operator



CONTINUOUS PRODUCTION needs clever use of materials-handling principles

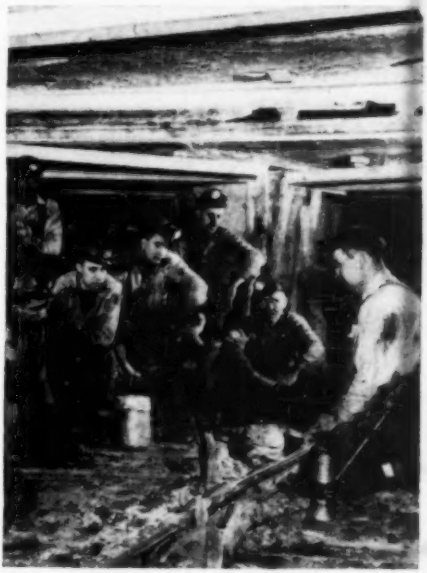
iency and low cost in mining are mainly the products of the machine. Coal mining must mechanize in production, in preparation and in all other phases of operation.

7. Planning for Safety—Safe mining is efficient mining. Ingredients are safe equipment, safe materials, safe methods and safe men—both management and miners. Also needed are safety education, training and incentive, plus proper discipline.

8. Upping Product Quality — The higher the quality, the higher market acceptance coal will have. This means a low-impurity, well-sized coal that is uniform day in and day out.

9. Maintaining Equipment—Results of neglected maintenance include excessive loss of production time and high repair costs. Maintenance should be put on the level where it properly belongs, and staffing and organizing on that basis.

10. Pricing for Value Rendered—The final test in successful mine operation



SAFETY EDUCATION and training must be well organized to be effective

is collecting enough for the product to keep the property in efficient condition and pay a good return to investors, management and miners. If the operator has his cost down and his quality up, there is every reason for him to charge for value rendered to the customer, and in that charge to include enough for the requisite net for sound operation, whether it be 10% or some other figure.—Coal Age, July, p86

Petrochemical Splurge

Crude petrochemical production in 1951 shot up to almost one-fourth over that in 1950, reaching a total of more than 8½-billion bbl. Last year's benzene production of 32-million gal. was three times that in 1950. Toluene showed a substantial rise from 45½-million to 56½-million gal. The C_4 aliphatics production, reflecting greater synthetic-rubber output, went up 76%.—Oil & Gas J, June 23, p47

Slab Costs Cut With Paper-Formed Hollows

Hollow-slab concrete floors and roofs require less concrete and steel than solid slabs for many types of loadings and spans. But because of the cost of forming the hollows, that type of construction has not always been the cheapest. A. J. Macchi, structural engineer, has come up with a novel method.

In his method, paper tubes serve as forms for the hollows. They are strong enough for the purpose and cheap enough to be left in the slab permanently. Construction methods are nearly the same as for flat-slab floors.

The paper tubes are tied to the bottom steel to keep them in place. Spacing of the tubes is fixed by a toothed templet. Where top steel is necessary it is laid directly over the tubes.—Eng News-Rec, May 29, p46

Where Aerosol Goes

About 60% of the aerosol fillers, who do about 80% of the total business, report that for 1951 they turned out over 34-million units. Space insecticides topped the list at 15½-million. Next came room deodorants at 7¼-million, personal products—shaving lather, shampoos, perfumes, deodorants and the like—at over 3½-million, miscellaneous products—novelties, dog sprays, mildew preventives, lubricants, antistatic sprays, etc. —at 3-million, and paints at 1¾-million. Residual insecticides, mothproofers, and clear plastic sprays accounted for a million each.—Chem Wk, June 21, p52.

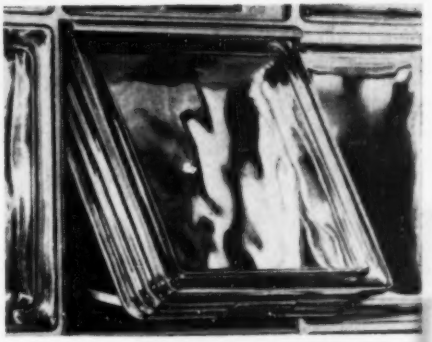
HOW TO KNIT "LEG-HUG" NYLONS

Single-carrier knitting with 40-tpi. 15-den. yarn on 60-gage machine results in a stocking that crawls into folds on the table (left). Two-carrier knitting makes a stocking that lies flat (right). In knitting, two or three carriers are used and the yarn is run over oily felt. An S and Z twist makes the stockings lie flat. Fifty extra courses knitted in the length compensate for tighter, smaller loops.—Textile World, July, p95

Block and Brick

Two new masonry materials are the 12-in. glass block offered by Pittsburgh Corning Corp. and the 2¼x5½x11½-in. brick developed by Structural Clay Products Institute. Both units were designed for economy.

And Another Block



Glass-block panels can be arranged for ventilation by unit made by American Structural Products Co. Panel-Vent encloses glass-block in swing-out aluminum frame.—Ceramic Ind, June, p43 and 44.

New Brick Speeds Laying

New brick is a through-the-wall unit needing no backup materials. Conventional in appearance, it can replace present 8-in. wall construction in homes of 1½ stories. Structural Clay Products Research Foundation developed the new brick.

Size of the SCR brick is modular but it can be used on non-modular design as well. The brick is vertically cored with holes of 1⅜-in. dia. to lighten its weight. It weighs about 8 lb.

The brick is designed for use with furring on which the interior surface materials and insulation can be mounted. Wood furring, 2x2 in., is recommended.—Am Builder, May, p156

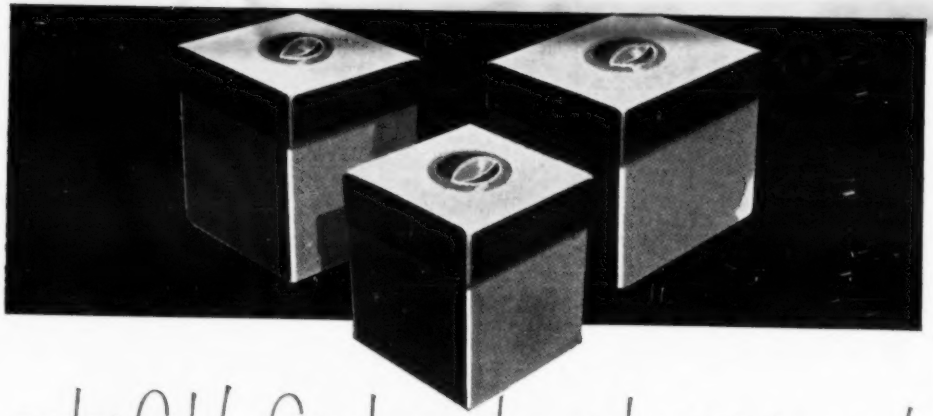
Isotopes Control Process

Nuclear gaging on Carborundum Co.'s coated-abrasive processing line controls variables with five Industrial Nucleonics Co. strontium-90 gages. Gage one measures backing weight of paper, cloth, or fiber; gage two the backing weight plus adhesive coating weight; gage three the backing, adhesive, and abrasive weights; gage four the total weight after preliminary cure; and gage five the final weight after final adhesive coating. Signals transferred into traces by pen recorders provide visual record of process.—Prod Eng, July, p178

Hot Welds Now X-rayed

Welds ordinarily have to be cooled to 100° F. before X-ray film can safely be placed on them. This takes time, and some alloys, before cooling, even have to be post-heated to relieve stresses.

A new process, developed at Sam Tour & Co., Inc., permits X-raying welds while still hot. The source of radiation is placed on one side. On the other, a hollow fixture is placed with the film on its outer surface. A cooling fluid flowing through the fixture keeps both it and the film cool.—Weld Eng, July, p51



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TEAR-OFF FOR TAPE

Convenience and better protection are features of Johnson & Johnson Co.'s new "Cut-Quick" adhesive tape dispenser. Serrated edge on lid forms a cutting edge for easy tear-off. The roll of tape turns on a tube that locks it inside the container.—Mod Packaging, June, p114

High Voltage Removes Dirt From Corn and Other Grains

Electrostatic separation, after 5 years of research and development at Quaker Oats Co., cleans corn to a degree considered impossible before its use. Now at work in five corn mills, it has reduced impurities to an almost undetectable level. Former removal was only 90% of the cobs, cob fragments, husks, seeds, stones, metallic fragments, and other foreign matter.

The electrostatic separator is placed at the end of the normal dry cleaning line. The grain passes over six grounded conveying rolls and past electrodes charged with 30,000 volts. The foreign matter takes a greater charge than the corn and is deflected out of the falling stream into a reject hopper.

Most of the foreign matter is removed at the first two rolls. The last four rolls finish the cleaning process. Reject from the roughing rolls is run through a mechanical cleaning system, and then over two reclaiming rolls. Final rejects amount to 3% of head feed. Reject from finishing rolls—about 25%—is also recirculated.

The company is now experimenting with cleaning of other grains. Other industries, including brewing and pharmaceutical manufacture, should find the process valuable. Installation advance fee of $20,000 has been set for a separator to clean 500 bu. per hr.—Food Eng, July, p53

Industrial Yarn Classifier

New instrument, called the Filometer, measures and records diameters of textile yarns. High-intensity beam of light is directed through the yarn so the changing amount of light that reaches a phototube measures the amount of material present.

The instrument is complete in itself. In one cabinet, it holds a creel, measuring head, recorder, and winder. Yarn to be measured is fed continuously through the measuring head. Record of measurements is made on chart paper by moving pens, and percentage variation existing in the yarn can be calculated from the chart.

Chief advantage of the instrument is that it is more accurate and has better stability than other similar instruments employing phototubes. It is not being manufactured at present. Deering Milliken Research Trust developed the classifier and holds patent rights.—Electronics, July, p110

Plan Leads New Attack on Materials-Handling Problem

Handling materials in most plants still costs too much. There is room for improvement. To put new emphasis on handling, one plant set up this program:

1. Look everywhere for materials handling.
2. Make full use of every good idea.
3. Look to other industries for ideas.
4. Use motion pictures to study handling methods.
5. Keep up with what is new in materials-handling equipment.
6. Adopt standard equipment wherever possible to handle materials.
7. Ask for help to get the best method.
8. Look for simple methods to solve problems.
9. Keep a project record that is complete.
10. Check the "futures" for each idea.
11. Make a second survey of the problem.—Factory, July, p114

Better Plywood Surfaces

Phenolic surfaces, applied during manufacture, give Douglas fir plywood new surface characteristics. The plastic surfaces are abrasion resistant, hard, resistant to water absorption and chemical action, easy to clean, and weather resistant.

Some applications include: reusable concrete forms, siding for buildings, interior cabinets, furniture, store fixtures, table tops, working surfaces, boats, and anti-slip flooring.

Plastic-surfaced plywood has a base of selected fir veneers laid up with waterproof phenolic adhesive. The surface itself consists of layers of phenolic impregnated paper or a mixture of resin and wood fiber.

In some types, the impregnated sheet is opaque, permitting painting. Other types have translucent surfaces that allow the grain pattern of the wood to show through.—Mod Plastics, July, p82

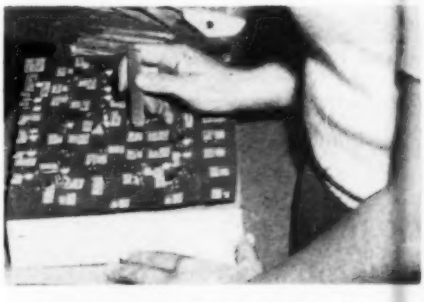
Water-Repellent Silicone

New silicone chemical, developed by General Electric Co., combines water solubility and water repellency properties. Its major proposed use is as a masonry water-repellent.

While other silicone water-repellents are on the market, GE's SC-50, unlike the others, can be incorporated with concrete during mixing because it is water soluble.

SC-50 is not limited to treating masonry. It holds possibilities as a water-repellent for textiles, paper products, and powdered materials. It will be useful too in preparing water-repellent silica aerogels and as an additive to improve washability of water-base paints.

SC-50 is a sodium methyl siliconate. It can be made from basic chlorosilanes with caustic or soda ash.—Chem Wk, June 28, p24



TEMPLET SPEEDS STAMPING

Simple labeled templets made of fishpaper improve accuracy and speed of rubber-stamping lettering on television chassis for small production runs at Allen B. DuMont Labs. Holes are cut in paper at each spot that needs lettering. Masking tape with lettering information is pasted next to hole.—Electronics, June, p220

NEW EQUIPMENT...

Pre-plasticized Plastics—Separate chamber mounted on molding machine reduces plastic to plastic state before it is delivered to injection chamber. Advantages include increased output, more uniform color, truer shape, and freedom from internal strains.—**Hydraulic Press Mfg. Co.**—Chem Eng, June, p212

All-purpose Filling Bobbin—New plastic bobbin can withstand compression of nylon yarns and degrading action of yarn-conditioning solutions. It is available in 7⅜ and 8-in. lengths for No. 5 head size.—**American Paper Tube Co.**—Textile World, July, p146

Cable Shuts off Power—Portable mining-machine cable reduces shock hazard and arcing. Cable cuts off power the instant damage occurs to positive conductor insulation.—**Anaconda Wire & Cable Co.**—Coal Age, July, p154

Smoked-meat Wrap—Trip-L-Wrap, recommended for wrapping hams and bacon, consists (1) outer wrapper of grease-resisting parchment, (2) middle sheet of absorbent paper, (3) inner grease-resisting barrier. An adhesive binds sheets together.—**Paterson Parchment Paper Co.**—Food Eng, July, p142

Divider Locates Eccentricity—Red Ring stock divider tells how much eccentricity unground gear has and shows high point of pitch circle. Divider's checking head indicates eccentricity on dial indicator. Use of divider allows operator to clamp gear on arbor while another gear is being ground; time is saved.—**National Broach & Machine Co.**—Am Mach, June 23, p168

Fluid-powered Valve—Type C valve is operated by hand or by remote control with condensate under boiler pressure (or by oil if desired). Pressing "close" button energizes solenoid that admits condensate below piston to close the valve.—**Ludeman Valve Co.**—Power, July, p156

High-voltage D-c. Supply—Model IT-99T regulated direct-current supply provides 5, 10 and 15-kv. voltages for operation of special oscillographs, television monitors, and other cathode-ray tubes. Unit is enclosed in 8¾x7x5⅝-in. aluminum case.—**Industrial Television, Inc.**—Electronics, June, p275

Horizontal Rotary Burner—Developed to achieve complete combustion, burner features horizontal-rotary design, V-belt drive of cup, four-hole hinge to circulate oil through oil heater, adjustable air nozzle, dual pumps. Units are available in sizes to 500 bhp.—**Superior Combustion Industries, Inc.**—Oil & Gas J, July 7, p111

PLUG-TYPE CIRCUIT BREAKER

New circuit breaker fits standard Edison base plug-type fuseholder rated at 110-125 v. ac. Called Mini-Breaker, it requires no rewiring or additional equipment on circuits rated at 15, 20, or 30 amp. It operates by a thermostatic bimetal heating from overload, bending, and letting spring-loaded plunger break the circuit. Pressing center plunger resets breaker. Manufacturer is Mechanical Products, Inc.—Elec World, June 16, p126

. . . AND MATERIALS

Cleans Cases Automatically—Soft-drink-case cleaner, incorporated into bottling lines, receives cases from conveyor and carries them around horizontal spiral. At top of travel, cases are blasted by air jets to remove dirt and other debris.—**Standard-Knapp Div., Emhart Mfg. Co.**—Food Eng, July, p97

Electron Microscope—Electrostatic unit has resolving power of 30 au. Microscope features are: freedom from astigmatism,, ease of alignment, high-quality image at direct magnifications up to 20,000×, large viewing screen.—**Farrand Optical Co.**—Paper Ind, May, p262

Prevents Corrosion—New vacuum de-aerator removes oxygen and free carbon dioxide from plant water, and thus helps protect piping, steel tanks, and other equipment from corrosion. Unit lowers water boiling point in vacuum, permitting soluble gases to escape.—**Permutit Co.**—Factory, July, p158

Immersible Snap-action Switch—Type 4HS snap-action switch is waterproof and so permits use in locations subject to immersion in water. It incorporates potted waterproof terminal leads and hermetically sealed contact chamber.—**Micro Switch Div., First Industrial Corp.**—Elec World, June 16, p222

Tank-car Sealer—One way to stop tank-car leaks in transit is to add a small amount of asbestos fiber to the liquid. Currents carry fibers to leak. Fibers mat and plug leak.—**Hercules Filter Corp.**—Railway Age, July 14, p57

Abrasives Clean Welds—Rubber-mounted abrasives, supplied in three textures in form of rods, blocks sticks, and wheels, simplify cleaning on aluminum, stainless steel, laminated materials, and others; removes tool and weld marks on steel and other hard alloys; produces special finishes on soft metals.—**Weldon Roberts Rubber Co.**—Weld Eng, July, p57

SAWDUST AND PLASTIC BOWLS

Attractive, economical salad bowls and other utensils are molded of sawdust and Monsanto Chemical Co.'s Lauxite urea resin. Granulated wood and resin mixture can be compression-molded by conventional methods. The resultant moldings have an attractive mottled appearance and are richer looking than a glossy piece. The bowls are molded by Ability Products Co.—Mod Plastics, July, p96

Labels Bottles—Machine applies three labels at a time. Speed is 150 labeled containers per minute. Round, square, oval, flat or paneled containers can be handled.—**Economic Machinery Co.**—Mod Packaging, June, p142

Hand Flame Cutter—Portable, hand-operated flame cutting machine weighs only 19 lb. Oxy-acetylene cutter will do straight and I-beam cutting, circle cutting to 1-in. radius, and bevel cutting. Plate thickness range is 5/64 to 2¼ in.—**American Pullmax Co., Inc.**—Auto Ind, July 1, p60

NEW EQUIPMENT (Cont.)

Tells on Color—Colormaster Differential Colorimeter is designed for color measurements on synthetic fibers, paints, pigments, and solutions. Operation is based on three filters. Complete measurement can be made in 30 sec.—**Manufacturers Engrg. & Equipment Corp.**—Chem Wk, May 24, p36

Medium-size Screw Machine—No. 4 automatic handles medium-size work requiring close tolerance, good finish. Features are 128 two-speed combinations giving range of 17 to 1,965 rpm., 1½-in.-dia. capacity, 5-in. turning length, 6-in. turret dia. Turret face is vertical.—**Brown & Sharpe Mfg. Co.**—Am Mach, June 9, p189

Straightens Steel Tubing — Guideless rotary straightener handles steel tubing in pipe sizes from ½- to 1¾-in. OD. and nonferrous tubing to 3-in. OD. Two 10-hp. d-c. motors drive six hardened alloy-steel rolls.—**Mackintosh-Hemphill Co.**—Iron Age, July 3, p140

Turret Head for Drill Press—Select-A-Spindle allows sequence drilling, countersinking, and tapping on a single drill-press spindle. Hand lever indexes turret without stopping the drill-press motor.—**Commander Mfg. Co.**—Factory, June, p184

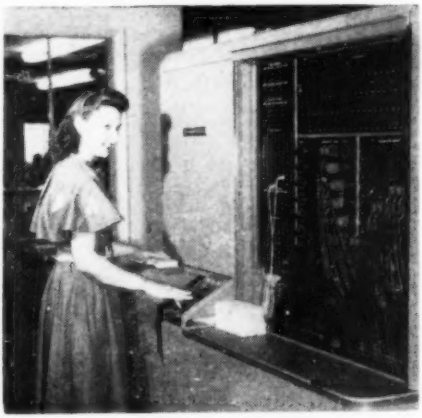
Flame-retardant Plastic—New resin formulation gives greater safety, does not impair punching or machining properties. Retardant extinguishes flames much faster than untreated plastic. Possible uses: in circuit breakers and aircraft equipment.—**Synthane Corp.**—Elec World, June 2, p131

Remote Pressure Control—Teledyne electrical pressure transmitter combined with continuous balance potentiometer offers accurate means to record and control fluid and gas pressures. Teledyne, a strain-gage type of pressure transducer, is available in 12 ranges from 50 to 10,000 psi. — **Minneapolis - Honeywell Regulator Co.**—Prod Eng, July p202

De-skids Tires — New machine creates skid-resistant tread pattern consisting of miniature rubber blocks. In starting and stopping, the blocks tilt as the tire contacts the highway, so that gripping edges are presented to the road surface.—**John Bean Div., Food Machinery & Chemical Corp.**—Fleet Owner, July, p122

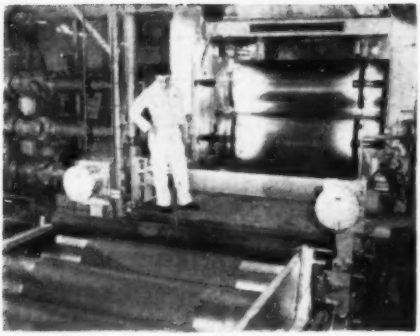
Porcelain Valve—Armored with fibrous glass-reinforced plastic, new valve is another weapon in the war against corrosion. Armor also protects porcelain against thermal shock.—**Lapp Insulator Co., Inc.**—Eng & Min J, July, p121

Electronic Heater—General purpose preheater is designed for molders of large plastic or rubber pieces. Heater has 15-kw. power output at 65 meg. and operates on 230 or 460 v. ac. It can preheat a 12-lb. load to 250° F. in 1 min.—**W. T. La Rose & Assoc., Inc.**—Mod Plastics, June, p142



DAY'S WORK IN 3 MIN.

Those punch-card run tickets in girl's hand would be a day's work for a skilled accountant. When she puts them in this Remington-Rand electronic computing punch, it makes 28 calculations on each ticket and punches answers in cards in 3 min. The machine, in use at Sunray Oil Corp. on only run tickets at present, will be applied to other accounting jobs.—Oil & Gas J, June 16, p178



PLASTICS CALENDER

Goodyear Tire & Rubber Co. produces more than 120 mi. per day of 6-ft. wide vinyl film in this calender. Machine is claimed to be the fastest ever built for making plastic film. Each of four rolls is 92 in. wide and 32 in. in dia. Adamson-United Co. made the calender.—Chem Eng, May, p218

Portable Lighting—Rolla-Duct portable branch circuit extension rolls power, light, and heat to any location. It can be raised to 5½ ft. and, collapsed, can be rolled under a job.—**National Electric Products Corp.**—Am Builder, July, p120

Slow-burn Foam—Styrofoam 33 is a self-extinguishing plastic designed for use in low-temperature insulation. New material is tinted blue.—**Dow Chemical Co.**—Chem Wk, June 28, p49

Is Your Plant Too Noisy?—Find out with type 1551-A sound-level meter that measures working-area noise levels. It also measures product noise. Range is 24 to 140 decibels. Unit weights 11 lb.—**General Radio Co.**—Electronics, July, p279

Cup Grinding Wheel—Cutting edge of cup grinding wheel remains sharp throughout its service life. Shell, 3/16 in. thick, resists "mushrooming" of wheel's cutting edge. Wear occurs evenly across entire wheel face.—**United States Rubber Co.**—Hardware Age, June 26, p108

Centrifugal Pump—Lightweight, self-priming pump has semisteel impeller and adjustable high-carbon-steel peeler. Rex Speed-Primers provide maximum capacities with mud and debris-filled water, instant starting in cold and wet weather, and quick inspection and maintenance.—**Chain Belt Co.**—Oil & Gas J, May 26, p225

Dye Reel Has V-bars—V-bars on new dye reel eliminates need of providing traction by covering dye reel. It can be installed on any make dyebeck. V-bars give gentle but firm gripping action to each strand of cloth in machine.—**James Hunter Machine Co.**—Textile World, July, p136

Atomic-hydrogen Welder — Redesigned welder incorporates new hot-start circuit, silicone insulation, and current range of 10 to 100 amp. Welder operates on 60-c. single phase with 75-amp. rating. Built-in capacitors correct power factor.—**General Electric Co.**—Power, July, p176

High-pressure Air—Tube-axial and vane-axial fans are designed for jobs in ventilating systems where high-pressure air flow is required. Fans are available in direct- or belt-driven units from 12 to 48 in.—**Harvey P. Bertram Co.**—Iron Age, May 22, p144

Plastic Piping—Tough, semiflexible piping is resistant to solvents, mineral acids, salts, and alkalies at temperatures to 150°F. It stays flexible to below −50°F. Known as cyclothene pipe, it is made in all sizes from ½ to 6 in.—**Munray Products, Inc.**—Prod Eng, June, p215

READER SERVICE

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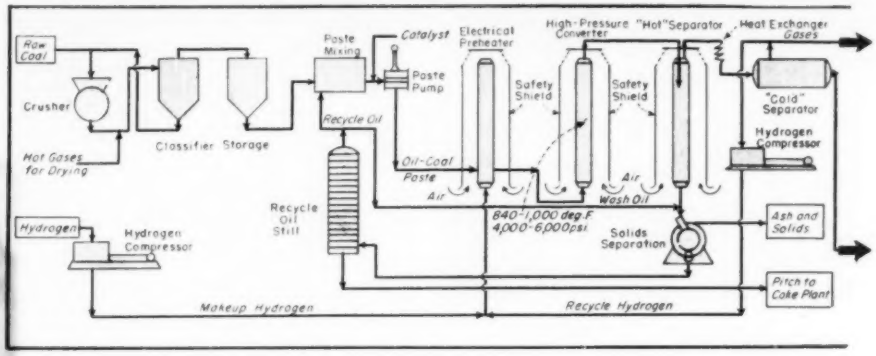
Coal and Hydrogen Give Chemical Fractions . . .



Coal Hydrogenation Process

New process now in pilot stage is designed to produce chemical products, not the usual liquid fuels, as the primary products

THE WORLD'S FIRST high-pressure coal hydrogenation unit designed to produce chemicals as the primary products is now in operation. It is a $11-million pilot plant built by Union Carbide & Carbon Corp. at Institute, West Virginia.

Building of the plant ends 17 years of research that cost the company $8-million. Another $2-million will pour into the project this year.

The pilot plant, which went on stream in the spring, treats 300 tons of coal daily and soon will treat 550 tons daily. Only 50 men operate the plant. The pilot operation will:

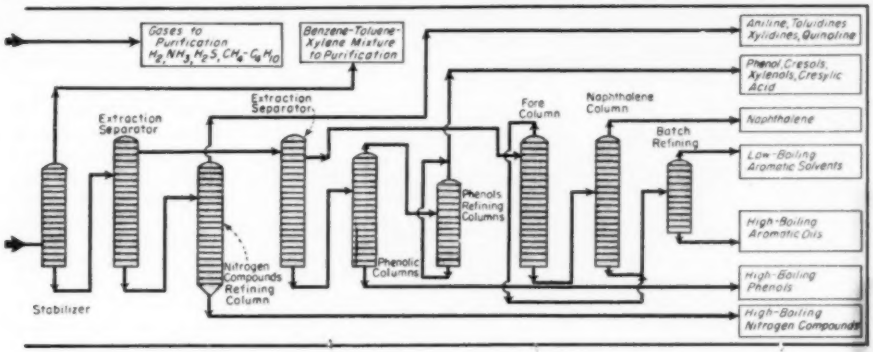
1. Yield design and operating data for a commercial unit.
2. Show the quantities of chemicals that can be economically recovered under various operating conditions.
3. Test different types of coal.
4. Give data on catalysts.
5. Recover enough products to permit marketing to begin.

Company engineers say the unit breaks even at 300 tons a day and will show a profit at 550 tons. The operation may be the forerunner of a vast, new field of aromatic chemicals. These chemicals command a premium price—that is why the company is not interested in liquid fuels. The process can be varied so large volumes of methane-to-butane gases are made.

The basic steps of the process are much the same as other hydrogenation processes, but the changes worked into the new process are the reason that the development is significant. The three basic steps are (1) prepare the coal, (2) react it with hydrogen, (3) separate out the products formed.

Coal is crushed, pulverized to 20 mesh, dried at 125° C. in hot gases from a producer burning natural gas or methane, and mixed with a highly aromatic recycle oil to form a paste of 25 to 40% coal. The paste is pumped at 6,000-psi. pressure to the hydrogenation area.

. . . That Are Separated Into Aromatic Chemicals



The coal is essentially dissolved in the oil before the paste reaches the hydrogenation reactor. Ash (8 to 15%) and fusain carbon (8 to 15%) do not dissolve but, because of equipment design, cause no trouble in the high-velocity streams.

The paste, with catalyst added, is preheated in an electrical preheater and mixed with high-pressure hydrogen. The mixture is pumped into the high-pressure, liquid-phase continuous converter; here the hydrogen reacts with the coal-oil solution at 840 to 1000° F.

This converter is the real heart of the process and probably the company's greatest contribution to coal-hydrogenation technology. It is a forged steel vessel 35 ft. high and 30 in. ID. The wall is made of a modified Cr-Mo-V steel with the chromium content raised to give greater resistance to hydrogen embrittlement and is lined with a refractory.

Feed materials flow up through the reactor in 3 to 4½ min. Reaction is exothermic. Practically all the coal, except ash and fusain carbon (fine charcoal), can be hydrogenated and broken down into aromatic chemicals. But this operation is not economical as hydrogen consumption mounts too high if the pitch-like material is hydrogenated into lighter products.

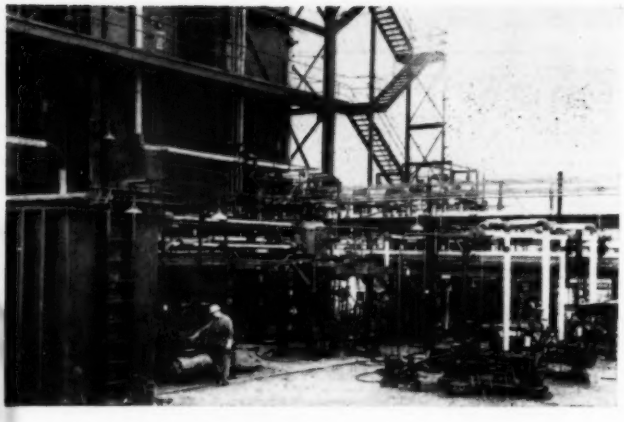
Operation in the reactor is free from coking—a major trouble that has plagued other processes. Principal causes are high hydrogen pressure, low reaction time, and absence of void spaces in the reactor.

The reaction mixture leaves the top of the converter and passes to the "hot" separator. Liquid and vapor streams are separated.

The liquid product contains solids, which are separated from the oil by a solids-separation process, such as centrifuging, filtration, flash vaporization. The oil then goes to the recycle-oil still where the pitch-like material is removed. Part of the oil is recycled to the paste mixing operation, and part to solids separation.

The vapor stream from the "hot" separator passes through a heat exchanger and to a "cold" separator that splits the product into gas and liquid. Most of the gases are sent to a hydrogen compressor for recycle to the process. They could be purified as indicated on the flow diagram.

The liquid stream from the "cold" separator is the chemical stream. It contains all the important chemical



***THAT VESSEL** in the center is the heart of the process—the hydrogenator. A high-pressure continuous converter, it reacts hydrogen with coal-oil paste at 840 to 1000° F. and 4,000 to 6,000 psi. Left of the converter is the preheater; at the right is the "hot" separator.*

products to be recovered: toluol, xylol, naphthalene, methyl naphthalenes, cresols, xylenols, phenol and higher monohydric phenols, aniline, toluidines, xylidines, quinoline, methylated quinolines, indole, and other higher-boiling nitrogen compounds.

The chemical separation plant includes the usual operations of distillation, fractionation, and solvent extraction. The variety and complexity of chemical products involved complicate the separation job. At least half of the $11-million investment went into the chemicals separation plant.

The aromatic stream is first broken into three principal fractions by chemical reaction and solvent extraction: (1) hydrocarbon, (2) phenolic, (3) arylamine and nitrogen heterocyclic.

Hydrocarbons are distilled into various products. One product, naphthalene, is purified by crystallization.

The phenolic fraction is separated by continuous distillation into two parts—one consisting of high-boiling phenols, the other of phenol, cresols, xylenols, and cresylic acid.

Crude hydrocarbon fractions can be refined into aromatic solvents and other products. The nitrogen-containing fraction is batch-distilled to yield aniline, toluidine, xylidines, quinolines, and other products.

Chemicals other than those already mentioned may be present in economically recoverable quantities. Typical of this category are indane, acenaphthene, fluorene, anthracine, phenanthrene, 3-phenylphenol, quinaldine, carbazole, indanol-4, indanol-5, 2-methyl-6-ethylpyridine, 3-methyllindole, and dibenzofurane.

No one yet knows what the markets will be for these chemicals or how soon the market will open up. Some of the products have never before been produced in commercial quantities. But the company is confident that the market is there, that there will be a demand once the chemicals are available.

As the present plant is pilot operation, few fully refined saleable end products will come out of the plant in the near future. First products will be refined mixtures of high-boiling phenols and hydrocarbon solvents.

But Union Carbide is so confident of the success of the process that we may see, within the next 5 years, a unit built to treat at least 3,000 tons of coal a day. —Chem Eng, June, p156

Brings Health Services to Remote Sections

New mobile medical coaches bring benefits of medical and dental services to people in remote areas. Built on truck chassis, these new units of "Health-on-Wheels" contain medical equipment, instruments and supplies ready for immediate use. Services available through the coaches include inocculations, chest surveys, dentistry and minor surgery.

"Health-on-Wheels" units are useful for propagating public health information. They also provide medical personnel with excellent opportunities for training in the field. Other uses are the treatment of epidemics, for mass immunizations, and as emergency hospital units.

The coaches are designed and equipped by Medical Coaches, Inc. Abbott Laboratories, Lederle Laboratories Div., Upjohn Co. and Westinghouse Electric Corp., provided some of the equipment and pharmaceutical products.—Pharm Int, July, p22

For catalog offering see p 77

Ink Detects Surface Cracks

Fluorescent ink and ultraviolet light show up surface cracks in either ferrous or nonferrous metals and in plastics. The ink, called Glo-Mor, is made by Manchester Oil Refinery, Ltd., Manchester, England.

After a clean surface is covered with the ink, flooding it with ultraviolet light causes cracks to reveal themselves by a brilliant green fluorescense. The rest of the ink can be removed by a quick dip in carbon tetrachloride or wiping with a detergent. The crack pattern is then more clearly defined.

Typical uses include structural members of aircraft or internal-combustion engines, welded structures, hydraulic systems.—Mach, June 7, p891

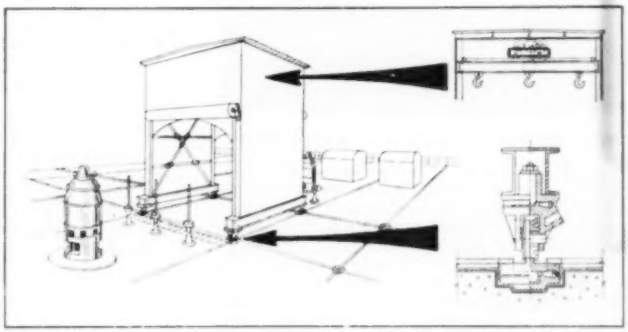
Rectifier Engines Tested

The first two ignitron-rectifier locomotives recently finished their tests. The locomotives have rolled up a combined total of 60,000 miles of service.

The locomotives, designed and built by Westinghouse Electric Corp., represent a new principle of electric-locomotive operation. Single-phase a-c. power from the overhead trolley is rectified by sealed ignitron tubes, and the d-c. output is supplied to series-wound d-c. traction motors that drive the locomotive. Economies possible with an a-c. trolley system and the tractive advantages of d-c. motors are combined in the same locomotive.—Railway Age, June 30, p66

CRANE TRAVELER REMOVES PUMPS

Pumping plant at U. S. Steel's Fairless Works has no superstructure; it is completely below grade. Traveling crane riding rail grid on operating-floor slab can straddle and remove any pumping unit. Steel shed encloses crane. Otherwise, operating floor is unsheltered.—Eng News-Record, July 10, p40



Four-Point Program Cuts Maintenance Costs

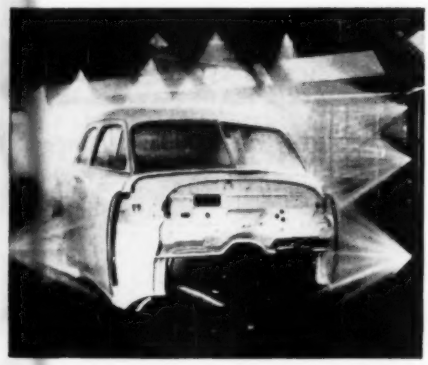
A four-step maintenance program at Perfection Stove Co. helped cut maintenance costs 25%. The program looks like this:

1. Get suitable quarters for the maintenance department. Clerk, records, tool and parts crib, and maintenance and plant-engineering office should be readily accessible to all workers and group leaders.

2. Get the machine tools maintenance needs. When all the possible savings from a given piece of equipment are considered, they often justify purchase of tools.

3. Get plenty of portable tools and accessories. The maintenance tool crib should carry a good supply of the tools that craftsmen are not required to have in their own chests.

4. Get special carts that move equipment to the job. If you have to move tools and supplies to various jobs, special tool and supply carts are necessary. They should be large enough to carry a supply of tools and material, heavy enough to provide a solid workbench, and maneuverable enough to travel on elevators.—Factory, June, p96



WATERY AUTOMOBILE-BODY TEST

High-pressure jets of water provide a practical means of testing methods of sealing car bodies against moisture, dust, and drafts in this 100-ft. water tunnel at the body plant of the De Soto Div., Chrysler Corp. Operating at a water pressure of 40 lb. per sq. in., 78 nozzles spray more than 550 gal. of water over body in 4 min.—Auto Ind, July 1, p17

Eight-Ends-Up Drawing

Eight-ends-up drawing made it possible for Firestone Textiles to improve its drawing on a one-process basis over the old two process drawing. Sliver variation was reduced from 33% to 15% and roving variation from 42% to 36%.

Change-over consisted of new top and bottom rolls and bearings, and new gearing throughout. Top and bottom clearers were replaced. Ball bearings were used throughout.

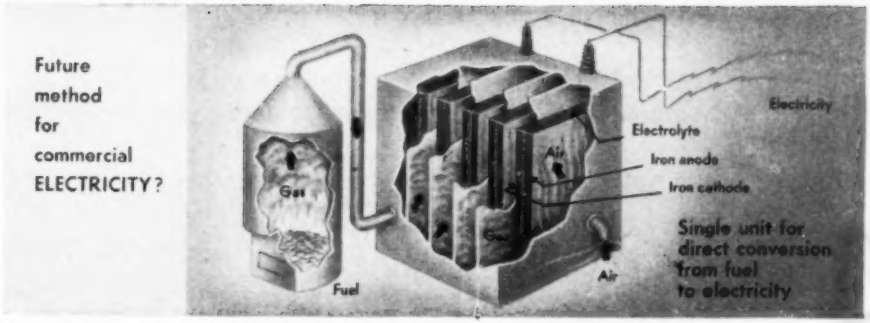
New drawing rolls are made with a stationary ball bearing on both top and bottom rolls. These ball-bearing sleeves do not revolve and are made so that they form a permanent separation that will not wear.

Roll bosses are over 10 in. long. This enables the rolls to satisfactorily run the eight-ends-up instead of the usual six. The sliver is spread out on the surface of the rolls, insuring no crowding or doubling-over in drafting and resulting in a more uniform sliver.—Textile World, June, p115

Extruded Aluminum Tubing

Downward impact extrusion, or "squirting", at AiResearch Mfg. Co. produces scratch-free aluminum-alloy tubes for heat exchangers. Wall thicknesses are as thin as 0.0065 in.; tolerance is 0.0005 in. Tubes up to 36 in. long are extruded, with less than 0.1% scrap.

Slugs are cut from bar stock to a size determined by tube length and wall thickness. Then they are cleaned in rotary drums, annealed, cleaned again,



NEW PROCESS may make commercial electricity in the future by converting . . .

flattened, pierced in one end to retain centering punch, annealed, rinsed, and lubricated.

They are hopper fed to the extrusion press and extruded two at a time in dies held within 0.0002 in. Tubes are ejected at red heat, straightened, cut to length, heat-treated, and dimpled to add more strengh and surface area for heat transfer.—Am Mach, May 26, p100

Airless Blast Cleans Tubs

Specially designed airless blast cabinet now in use by a sanitaryware manufacturer is cleaning 120 bath tubs, 96 sinks, or 720 lavatories per hr. Within the cabinet, five rotating wheels blast the ware by centrifugal action as it is carried through on rotating hooks suspended from a monorail conveyor.

Hook rotation permits the abrasive to reach all areas of the metal to be cleaned. One tub, eight sinks, or six washbowls can be carried on each hook.

The metallic abrasive removes thin iron layers covering trapped dirt and gas in the castings, thereby preventing blisters during enameling. Cleaned ware comes from the cabinet with a matte finish. American Wheelabrator & Equipment Co. made the cabinet.—Ceramic Ind, July, p61

Coal to Electricity

Recently Pittsburgh Consolidated Coal Co. started construction of an experimental unit that will convert coal almost directly to electricity. Practically all the places where energy is lost have been omitted.

The process works like this: carbon is heated in contact with steam to produce a gas. This gas is fed into a fuel cell where it produces electricity directly, by a method similar to the process that takes place in a storage battery. As the gas steals oxygen from one electrode, other oxygen to replace it is absorbed from air passing the other electrode. The movement of oxygen from one side of the cell to the other produces the electricity.

Pitt Consol thinks the new process will give twice as much electricity per pound of fuel as was possible before. It expects 80% of the fuel's energy to emerge from the unit as electricity; whereas present steam plants now yield only 35%.

Added efficiency comes from the hot exhaust gases used to heat water and produce the steam fed into the gasification chamber. By using and reusing all possible sources of energy, the high degree of efficiency will be obtained.—Business Wk, June 28, p74

ST. JAMES ST., core of the great industrial and financial center that is Montreal, is seen through the pillars of a bank at Place D'Armes.

- **If you are looking for new overseas investment opportunities or for a fast-growing new market**
- **If you need new sources of supply—of aluminum, iron ore, asbestos, titanium, nickel, woodpulp, food**
- **If you are interested in migrating to a new land of opportunity that welcomes a high type immigrant**

Don't Overlook . . .

Canada—Industrial Frontier

Report to Management

CANADA is in the midst of an enormous boom.

Since oil was discovered in the Prairie Provinces in 1947, $1-billion has been invested in its development, production has soared to seven times the 1947 level, and by 1957 local supplies will cover all the Dominion's requirements.

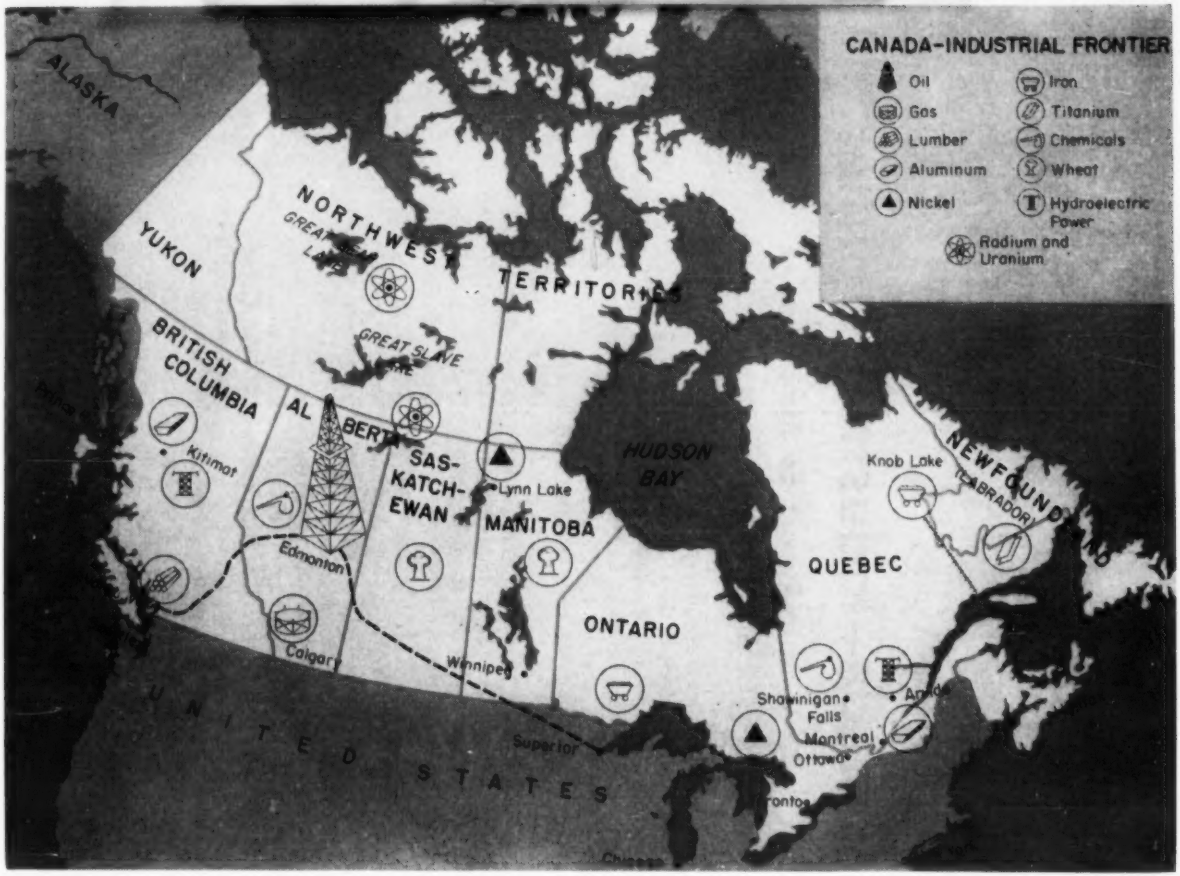
Second only to oil in stimulating Canada's new economic boom is iron. The Labrador-Quebec deposits, 320 miles north of the St. Lawrence (see map on next page), are now rated as even greater than the famous Mesabi supply in the United States. Production from reserves now estimated at 400-million tons of high-grade ore will by 1955 be flowing to market at the rate of 10-million tons of ore a year.

Hydroelectric power construction—to feed a roaring industrial expansion—will add 1,700,000 hp. by 1955 to a capacity that has already topped 13,340,000 hp., second only to the U. S. Biggest single power unit in this huge expansion program will be the $160-million plant at Kitimat, British Columbia, to supply power for the world's largest aluminum plant which is scheduled for early completion.

Canadian nickel companies, already producing more than 90% of the world's nickel, have started a $160-million expansion program; and other mining interests are rushing a $40-million development program that will make Canada far and away the world's greatest producer of titanium.

Last year, 195,000 immigrants poured into the country, helped to boost the population above 14-million (22% above 1941). The rush has continued into 1952, helps give substance to current estimates that by 1975 Canada will have a population between 25- and 30-million. While only a sprinkling of immigrants arrive by plane, the influx from Holland alone has brought a rush of business for KLM-Royal Dutch Airlines.

The new boom has brought with it the excitement of an old-time gold rush with all the accoutrements of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Aluminum
Nickel
Iron
Titanium
Chemicals
Wheat
Hydroelectric Power
Radium and Uranium
ALASKA
YUKON
NORTHWEST TERRITORIES
GREAT SLAVE LAKE
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
HUDSON BAY
ONTARIO
QUEBEC
NEWFOUNDLAND
LABRADOR
Kitimat
Edmonton
Calgary
Lynn Lake
Knob Lake
Wennipeg
Shawinigan Falls
Montreal
Ottawa
Toronto
Superior
UNITED STATES

the mechanized mid-twentieth century.

When officials of the Aluminum Company of Canada decided to locate a vast, new hydro-aluminum plant on the rugged uninhabited shores of the Pacific 350 miles north of Vancouver, they landed their first construction crews on an open beachhead from wartime landing boats used originally during the war in the Pacific Islands.

Industry Comes to a Wilderness

Today, less than 2 years later, modern piers receive ocean-going ships, and a thriving town of 6,000 people pulsates with activity as workmen drill the 10-mile tunnel through which the waters of a mountain river will rush in a half-mile drop to an underground power plant. Before the turbines in this 1,650,000-hp. plant are ready to turn, an aluminum smelter with a capacity of 500,000 tons of metal will be ready to refine bauxite arriving by ocean from Latin America and islands in the Caribbean.

And, to avoid the slow, expensive job of building mountain highways, a helicopter carries from crag to crag the crew that is installing the high-tension towers that will carry the electricity to the string of plants forming the world's largest aluminum mill.

The new atomic age has a special meaning for Canadians. Uranium ore in large quantities around Great Bear Lake in the far north has made Canada a potent rival of the Belgian Congo. Today, hundreds of geological exploration parties—many of them in airplanes equipped with Geiger-counters—are busy scouring the northwest for new deposits. Hardly a week passes without a secret report to Ottawa of important new discoveries.

Symbolic of the scale on which Canada's rich northern frontier is being pioneered is the experience of the Sherritt Gordon Mines, Ltd., in northern Manitoba. Its copper mines at Sherridon were exhausted years ago and Sherridon itself became a ghost town.

Now, the discovery of rich new copper-nickel deposits at Lynn Lake, 150 miles to the north, has imbued this region with new life. The Canadian National Railway last year started building a line from Sherridon to Lynn Lake. In the meantime, the Sherritt Gordon took advantage of the frozen ground last winter and moved 160 houses by tractor to the site of the new mines in order to expedite their opening.

What Makes Canada Boom

What is behind this spectacular boom? What makes the Canadian economy tick? Here are the answers:

- Plentiful natural resources—in arable land, forests, fur animals and fish, and especially in gold and base metals. Canada ranks first in the world in the production of nickel, platinum, and asbestos; second in gold, zinc, aluminum, cadmium, selenium, and uranium; third in silver; fourth in copper and lead.
- A rapidly growing, industrious population (14,009,429 in 1951—21.8% over 1941) with a high immi-

FRONT COVER — Welders work on Interprovincial's crude oil pipeline from the Alberta oil fields to the Great Lakes.

IN TEN YEARS Canada's gross national product has nearly tripled. It is one of the signs that point toward a new industrial world power.

gration rate during the last years (194,000 in 1951—highest figure since 1913).

- Abundant sources of energy—scarcity of coal being more than compensated by hydro-electric power, oil, and natural gas.
- A record rate—the highest in the world—of capital investment, supported by a high inflow of foreign capital.
- A sound economic, fiscal, and monetary policy creating a favorable climate for free enterprise, foreign trade, and the investment of foreign capital.

Of the three main sources of energy—coal, oil, and water power—Canada has been endowed by nature with only limited coal deposits. Her coal mines now in operation, mainly in Alberta, British Columbia, and Nova Scotia, cover only about one-half of the country's requirements.

But this handicap is more than offset by Canada's huge resources of water power and by the spectacular development of the Canadian oil industry since 1947—the year of the discovery of the rich Leduc oil field in Alberta.

Second in Hydroelectric Power

Only the U. S. has more developed hydroelectric power than Canada. At the end of 1951, Canada's total installed capacity topped 13,340,000

How Much Outsiders Own in Canada...

(millions of dollars)

From	1939	1950	1951
United States	4,151	6,565	7,235
United Kingdom	2,476	1,723	1,772
Other Countries	286	358	417
Total	6,913	8,646	9,424

hp., but 1951 alone had seen the addition of 881,250 hp. and more than 1,700,000 hp. are now on order and will be producing before 1955.

A large number of these new plants are in sparsely settled areas. This indicates that Canadian authorities have an accurate check on new raw-materials sources and are aggressively pushing a systematic program for speedy development.

Projected potential will boost Canada's capacity to 29,380,000 hp. at ordinary minimum flow and to 50,310,000 hp. at ordinary 6-months' flow. Areas of greatest potential expansion are British Columbia, Quebec, and Labrador-Newfoundland.

Although the Canadian oil boom started only 5 years ago, the country has reached nearly the half-way mark toward achieving self sufficiency in the supply of crude oil and oil products. Since 1947, the proven oil resources have increased about 30-fold—from 45-million to nearly 1.5-billion barrels.

Notwithstanding the large increase in consumption, Canada by the end of 1951 has raised her supply of domestic oil products from 8 to 33% of requirements. This share may be increased to 50% by 1953.

Canada's Oil Saves U. S. Dollars

Already Alberta oil, by replacing imports, has enabled Canada to save U. S. dollars to the extent of $150-million in 1951, against only $8-million in 1948. One-billion dollars were sunk into this development of the country's oil resources up to the end of 1951—mostly by American oil companies. Another $200-million are expected to be invested in exploration, drilling, refining, and the construction of pipe lines in 1952.

Lately, the discovery of natural gas has added to this development. Already, in the province of Alberta, dwellings in most cities are heated with natural gas and industrial plants are burning it as fuel, both at exceedingly low prices. Also, natural gas is used increasingly as basic material by numerous chemical plants.

The provincial Government of Al-

***GRAIN ELEVATOR** at Fort William, Ontario, stores grain for the world's markets. Present plans for a deep channel along St. Lawrence River will permit shipment of grain direct to eastern parts.*

berta is pursuing a cautious policy in regard to the conservation of its oil and gas resources. It has also succeeded in largely eliminating speculation in regard to the lease of oil lands and the formation of "soap-bubble" companies. Export of natural gas to British Columbia and to the northwestern part of the U. S. merely awaits the final approval from Ottawa.

World's Largest Oil Reserve

In addition to the proven reserves of oil and natural gas, Canada also has the fabulous oil-sand deposits along the Athabaska River. They have been called the largest single reserve of oil in the world. Official Canadian and American estimates range from 100- to 250-billion barrels. Because the problem of commercial extraction of oil from these sands has still to be solved, the recent new method suggested by the Swedish Shale Oil Co. for extracting oil from oil sands has aroused new hopes of an early solution.

The phenomenal industrial growth of Canada during the past decade was featured mainly by the development of primary industries, based on the country's mineral resources. But now the growing population and domestic market are leading to a rapid expansion of a wide range of manufacturing industries.

A large percentage of industrial equipment from the mushrooming manufacturing plants is already being supplied by Canadian industry. But demand still leaves room for big orders of imported foreign equipment.

On the other hand, the rapidly growing population with its high standard of living comparable only to that of the U. S., is widening the

market for the expanding production of consumer goods, be it durables like automobiles, refrigerators, and washing machines or nondurables like textiles, clothing, and shoes.

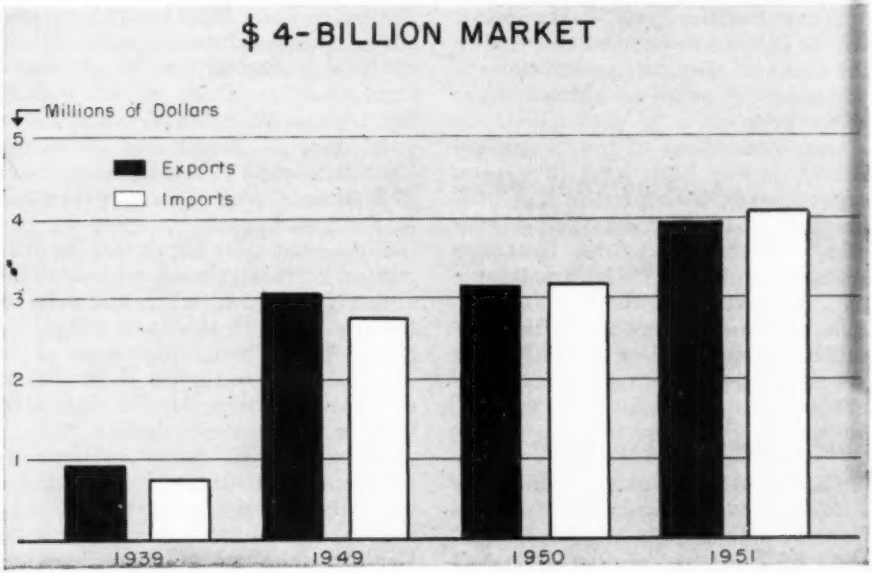
By an official count, more than 150 new manufacturing industries have been started in Canada during the last 2 years. A number of subsidiaries were opened by British manufacturers, though these activities are still hampered by the restrictions imposed by the British government on the movement of capital out of the country.

Significantly, West German manufacturers are developing a strong drive with a view to securing a share in this promising market. The German participation in the Canadian International Trade Fair in Toronto in June 1952 (McG-H Digest, Aug, p23) was one of the most impressive testimonies of this effort, especially in regard to machine tools and other machinery.

Third in Foreign Trade Volume

In 1951, Canada bought $4,083-million of foreign merchandise, compared with $2,379-million in 1946. In spite of being essentially a "continental" country with a territory exceeding that of the U. S., Canada both economically and financially is most closely interlocked with the world's markets.

By the volume of her foreign trade, she is—after the U. S. and the United Kingdom—the third biggest trading country of the world. In 1951, Canada exported $283 and imported $291 of goods per capita. The corresponding figures for the



Rich in Hydroelectric Power

Province or Territory	1951 Capacity (thousands hp.)	Potential 24-hr. power at ordinary 6-mo. flow (thousands hp.)
British Columbia	10,998	1,358
Yukon & NW Territory	814	28
Alberta	1,258	208
Saskatchewan	1,120	112
Manitoba	5,562	596
Ontario	7,261	3,719
Quebec	20,219	6,755
New Brunswick	334	133
Nova Scotia	156	151
Prince Edward Island	3	2
Newfoundland (Labrador)	2,585	279
Total	50,310	13,341

U. S. were only $100 and $73, respectively.

Canada derives roughly one-third of her national income from exports. In the case of newsprint and nickel, the quota of domestic production exported to foreign countries rises above 90%.

One cornerstone of the "Canadian Boom" is the high level of capital expenditures, both private and public. This in itself is convincing testimony of faith in the country's economic future. With investments in 1951 officially valued at $4,581-million, Canada has one of the highest investment ratios in the world in relation to her gross national product.

Capital Goes into Expansion

Capital expenditures planned for 1952 involve an outlay of $5-billion. Canada will then be devoting about 22% of her gross national product to the creation of new production facilities and housing.

The spectacular industrial growth of Canada since 1939 would not have been possible without a large inflow of foreign capital, much of which came from the U. S. At the end of 1951, the book value of the accumulated foreign investment stake in Canada reached $9.4-billion, of which $7.2-billion, or 77%, represented U. S. capital.

This latter sum comprised $3,909-million directly placed in industrial enterprises in which the majority of the capital is U. S.-owned. The balance of $3,335-million was of a portfolio nature, being U. S.-owned minority holdings of the Canadian debt or equities.

Large as the inflow of foreign capital has been since 1939, the share of this capital in developing the natural and industrial resources of Canada is steadily declining—an-

ST. MARY DAM is key structure in gigantic Milk River hydroelectric development.

other testimony of the growing financial strength of the country. Significantly, the $296-million of American funds that entered Canada in 1951 for direct investment were only one-tenth of all new capital investment of an industrial nature.

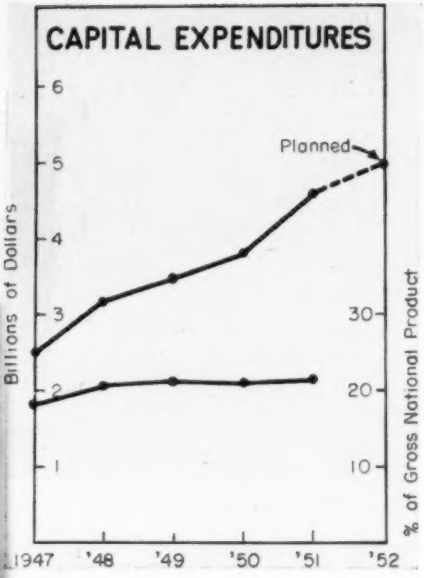
Welcome as American capital has always been in Canada in furthering the development of the country's natural resources, the fact that U. S. capital now accounts for 77% of investments is a matter of some concern in government and business circles. It explains why all initiative in capital investment by other countries, however limited and tentative, is viewed in Canada with considerable interest and sympathy.

This applies particularly to the increased interest in Canadian investments taken recently by financial and industrial circles of Switzerland, the only European country now able to export important quantities of capital. Expressions of this interest are the plant for the production of electrical machinery built by the world-known Swiss engineering concern of Brown Boveri & Co. in St. John (Quebec) and the project for the building of a large cement plant, also in Quebec, by a Swiss financial group.

Foreign Investors Get Paid

In 1951, Canada paid out in dividends to overseas investors $447-million, of which $378-million went to U. S. investors. Heavy as this liability may seem, it ultimately helps to develop Canada's ability to export and to reduce her need for imports. In 1930, it took nearly 20% of the proceeds of Canadian exports to meet the interest payments on Canadian obligations payable in U. S. currency and held in the U. S. In 1951, it took barely 2%.

A sound economic, fiscal, and mon-



etary policy has been one of the decisive factors contributing toward the industrial expansion of Canada and creating a climate favorable to private enterprise.

After the outbreak of the Korean war, Canada successfully halted inflation by means of fiscal and credit policies without resorting either to allocations of scarce materials (with the exception of steel) and to price controls.

National Budget: In the Black

Since 1946, the federal budget invariably has shown a surplus in spite of rising defense expenditures now nearly six times as high as before Korea. This surplus reached $211-million in the fiscal year 1950/51 and $356-million in 1951/52. In his budget for 1952/53, Dominion Finance Minister Douglas C. Abbott planned a surplus of only $9-million but past experience indicate that the actual surplus will be considerably higher.

The Dominion government has used these budget surpluses for a reduction of the national debt. The funded national debt declined from $16.5-billion in 1946/47 to $14.7-billion in 1951/52.

Tax Structure Favors Investment

The Canadian tax structure provides numerous incentives for the investment of private capital:

1. Corporate taxes on business contribute about 22% of total tax receipts, in contrast to 35% in the U. S.

2. The Dominion abstained from levying an excess profits tax in the Korean emergency.

3. Canada grants corporations nearly complete freedom to average good and bad years in computing taxes and permits current expenditures for research to be written off against expenses.

4. Newly established companies are taxed at a specially low rate during their first year of operation.

Since October 1950, Canada has pursued a consistent policy of doing away with foreign-exchange restrictions, thus removing one of the last barriers to foreign investments of capital. In the last few months, following a 2-year influx of foreign investment capital, the Canadian dollar has passed parity with the U. S. dollar.

This development, though naturally a matter of pride and satisfaction to the Canadians, was not

What You Can Sell to Canada

(Imports in millions of dollars)

	1937	1949	1950	1951
Production goods				
Farm implements and machinery	17	177	162	195
Machinery (except agricultural)	46	216	226	329
Electrical apparatus	16	70	83	120
Chemical products	37	131	158	192
Consumer goods				
Cotton goods	20	73	67	87
Woolen goods	19	63	52	68
Synthetic fibers	4	30	21	35
Glassware	9	25	28	32

without drawbacks. While it reduced the cost price for the Canadian importer of foreign merchandise, it raised Canadian export prices.

Along with freeing of the Canadian exchange rate and appreciation of the Canadian dollar went the gradual liberalization of foreign-exchange controls, culminating in their complete abolition on December 14, 1951. By this step, full freedom in the movement of capital to and from Canada was established.

Canada Welcomes Outside Help

If the eyes of the world are on Canada, so also are the eyes of Canada on the world.

With such vast natural resources and only 14-million people, Canadians know they must encourage active participation from outside their borders—in trade, investment, branch-plant development, and population growth. That is why:

• Regional leaders from several provinces are scouring the U. S. to interest manufacturers of specific lines in coming to Canada to start a local factory.

• Branch offices of two Swiss, two French, one Belgian, and two British banks or investment groups have been welcomed in Montreal in the last 18 mo.

• One group of West Coast producers have sold their entire output of iron ore to a Japanese firm and other firms are actively scouting Japanese and other Far Eastern markets for big new outlets for their products.

• Canada's commercial banks have set up development departments to encourage and handle responsible inquiries from both domestic and foreign business leaders.

• The Ottawa government has strengthened its staff of 50 trade commissioners stationed all over the world to stimulate business, and Canada, shrewdly looking ahead to

its fullest economic development, has decided to build the St. Lawrence Seaway alone since the U. S. so far has refused to participate.

• Merrill Lynch, Pierce, Fenner & Beane—world's largest stock and commodity brokerage firm—has opened an office in Toronto and plans to open others in Montreal and Vancouver.

Canada is setting out confidently to live up to its new reputation as one of the world's fastest growing industrial powers.

If You Need More Information about Canada . . .

. . . here are agencies that are ready to help you:

Canadian Embassies and Legations throughout the world. Or you can write to the Industrial Development Division, Department of Trade and Commerce, Ottawa.

Canada's Ten Chartered Banks, with 3,500 branch offices throughout the country, will answer questions on finance, trade, and industry.

Bank of Montreal, 119 St. James St. W., Montreal, Quebec

Bank of Nova Scotia, 38 Melinda St., Toronto, Ontario

Bank of Toronto, King and Bay Streets, Toronto, Ontario

Banque Canadienne Nationale, Place d'Armes, Montreal, Quebec

Banque Provinciale du Canada, 221 St. James St. W., Montreal, Quebec

Barclays Bank (Canada), 214 St. James St. W., Montreal, Quebec

Canadian Bank of Commerce, 25 King St., Toronto, Ontario

Dominion Bank, 1 King St. W., Toronto, Ontario

Imperial Bank of Canada, 51 King St. W., Toronto, Ontario

Royal Bank of Canada, 360 St. James St. W., Montreal, Quebec

Canadian International Trade Fair headquarters, Toronto, will provide information on exhibiting your products at the annual Fair, or about the Canadian market for your goods.

Other Agencies:

The Canadian Chamber of Commerce, 530 Board of Trade Building, Montreal

Canadian Manufacturers' Association, 67 Yonge Street, Toronto

Industrial Manager, Canadian Pacific Railway Company, Montreal

Chief of Development, Canadian National Railways, 360 McGill Street, Montreal

Additional information on establishing a branch plant in Canada may be found in the Canadian Industrial Development Manual, obtainable from any Canadian commercial representative or from the Industrial Development Division, Department of Trade and Commerce, Ottawa.

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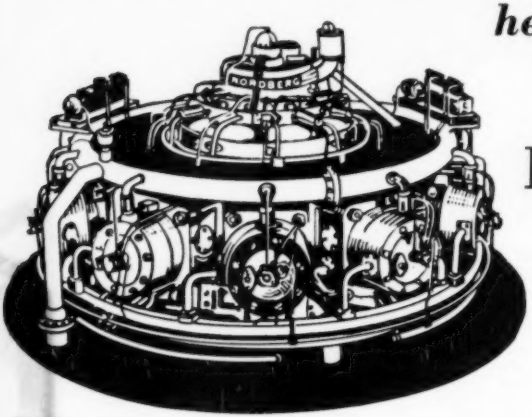

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from Manufacturers' Catalogs

9-1 Diagonal Gear Shaving — National Broach & Machine Co. 8p. Bulletin S-51-3 tells how to increase gear production by using Red Ring diagonal gear-shaving machine.

9-2 Metal-enclosed Switchgear — Westinghouse Electric International Co. 30p. Description and application of "Unitized" low-voltage metal-enclosed switchgear are given in booklet B-5282.

9-3 Builders in Steel — Dominion Bridge Company, Ltd., 48p. Booklet reviews wide range of steel products and engineering services available from company.

9-4 Making Aluminum — Reynolds Metals Co. 16p. "Welcome to Troutdale" pictures the story of alumina to aluminum pig at Reynolds' Troutdale plant.

9-5 Industrial Recording—Sanborn Co. 22p. Folder contains bulletins 1 through 11 on industrial recording systems, amplifiers, and recorders.

9-6 Variable Speed Drive—Louis Allis Co. 16p. Bulletin 611-D describes specifications and applications of Ajusto-Spede variable speed drive.

9-7 Oil Burners — Cleaver-Brooks Co. 8p. Form AD-102 covers complete line of Hev-E-Oil burners with maximum capacities of 5 to 60 gal.

9-8 Classification Unit—Dorr Co. 16p. The DorrClone, a compact, cylindroconical classification unit utilizing centrifugal force, is described in bulletin 2500.

9-9 Help For Foreign Traders—The Royal Bank of Canada. 30p. Canada's largest bank, with 62 overseas branches, summarizes its services and offers economic information on Dominion's new raw materials.

9-10 Safeguard Pipelines—Airco Co. International. 24p. Booklet 49-1 describes Pentalarm and equipment used in odorizing odorless fuel gases.

9-11 Health-on-wheels — Medical Coaches, Inc. 8p. Bulletin gives general specifications of custom-built mobile medical units.

9-12 Exhaust Hoods—American Air Filter Co., Inc. 22p. How exhaust hoods have been designed for many operations in metalworking is shown in bulletin No. 270-E1.

9-13 Turbine-blade Grinder—Pratt & Whitney Div., Niles-Bement-Pond Co. 6p. Fold-out pictures new Turbine Blade Airfoil Grinder and gives specifications.

9-14 Agricultural Equipment — John Bean Div., Food Machinery & Chemical Corp. 8p. Folder L-843 covers Model 51 potato harvester. L-846 describes two-way cleaners for fruits and vegetables.

9-15 New Horizons in Aluminum — Aluminum Limited. 32p. Booklet gives details of Canada's growing aluminum industry, including Kitimat, largest aluminum plant.

9-16 Steam-trap Problems—V. D. Anderson Co. 36p. "Solving Steam Trap Problems" contains practical information for specifying, installing, and servicing steam traps.

9-17 For Stronger Paper—Hercules Powder Co. 12p. Catalog describes properties & applications of Kymene, a strongly cationic resin for wet-strength paper.

9-18 Small Tools—Brown & Sharpe Mfg. Co. 224p. Machinists' tools; gages; milling cutters and hobs; arbors, adapter and collets; screw-machine tools; and pumps are some of the tools described in catalog 35.

9-19 Chemicals—Pittsburgh Coke & Chemical Co. 12p. Bulletin lists the principal industrial and agricultural products of the company and gives specifications.

9-20 Electric Heat—Edwin L. Wiegand Co. 24p. Bulletin describes Chromalox electric heat's advantages in plastics processing and gives 14 case studies.

9-21 Container Labeling—Paisley Products, Inc. 8p. Application of paper labels to cylindrical containers is covered in technical service bulletin No. 16 "Round Container Labeling".

9-22 Mechanical Presses—E. W. Bliss Co. 20p. Catalog 17-D illustrates new straight-side, double-crank presses identified as S-2 presses. It gives detailed specifications.

PRODUCTION IDEAS (Cont.)

9-23 Electric Control Thermometers—Minneapolis Honeywell Regulator Co. 9p. Recording and indicating circular-case electric-control industrial thermometers are described in catalog 6482.

9-24 Weed Killer—Monsanto Chemical Co. 11p. Technical Data Sheet gives information on MCP, a hormone-type weed killer.

9-25 Materials Handling — Link-Belt Co. 28p. Photographs of Bulk-Flo conveyors and elevators in wide variety of applications are given in catalog 2475.

9-26 Grinding and Polishing—Norton Behr-Manning Overseas, Inc. 16p. Vol. 43, No. 6 of "Grits and Grinds" has articles on snagging costs; centers and center holes; metal polishing.

9-27 Fluid-power Circuits — Logansport Machine Co., Inc. 32p. Pocket-size manual "Circuit Rider" discusses the many possibilities afforded by the use of different types of circuits.

9-28 Tubing Failures—Babcock & Wilcox Co. 40p. Factors affecting tube life in high-pressure, high-temperature applications are presented in booklet TR-516.

9-29 Filters — International Filters, Ltd. 26p. Collection of bulletins gives data on stainless-steel filters and their use in industry.

9-30 Heavy Construction Work—Merritt-Chapman & Scott Corp. 16p. February "Black Horse News" has articles on construction of paper mills, dams, tunnels.

9-31 Industrial Research — Battelle Memorial Institute. 16p. "Battelle Research in Engineering Economics" describes the services offered by this organization.

9-32 Material Spreaders—Gar Wood Industries, Inc. 8p. Folder illustrates construction and gives specifications of Buckeye Model 5 surface material spreader.

9-33 Plastics Molding Machines — Hydraulic Press Mfg. Co. 16p. Four models of all-hydraulic plastics injection-molding machines are pictured in bulletin 5204.

9-34 Montreal—Canada's Financial Hub—Economic and Tourist Development Bureau. 64p. Quebec's manufacturing, transport, retail, and financial facilities are summarized for the management man interested in the Canadian market.

9-35 Where to Build Your Plant in Canada—Research and Development Dept., Canadian National Railways. 8p. and large detail map. Big new engineering department offers survey facilities to manufacturers seeking to locate new plants in Canada.

9-36 Industrial Chemicals — Shawinigan Chemicals, Ltd., 36p. List of chemicals available for export, with summary of properties, uses, and in what form available.

9-37 Canadian Investments — Merrill Lynch, Pierce, Fenner & Beane. 48p. Study—from an investment point of view—of leading stocks in Canada's key industries. Special emphasis on petroleum, mining, chemical industries.

9-38 Dust Collectors—American Wheelabrator & Equipment Corp. 16p. Bulletin 152 describes operation of dry-dust collector.

These manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 West 42nd St., New York 36, N. Y., U. S. A.

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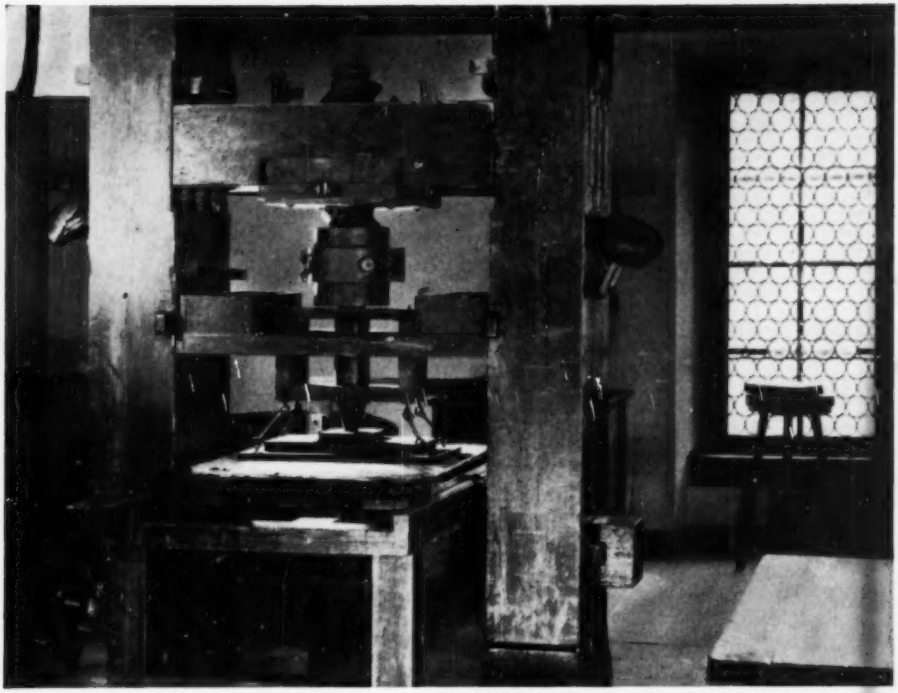

Reconstruction of the Gutenberg Press

Photo, courtesy Gutenberg Museum, Mainz, Germany

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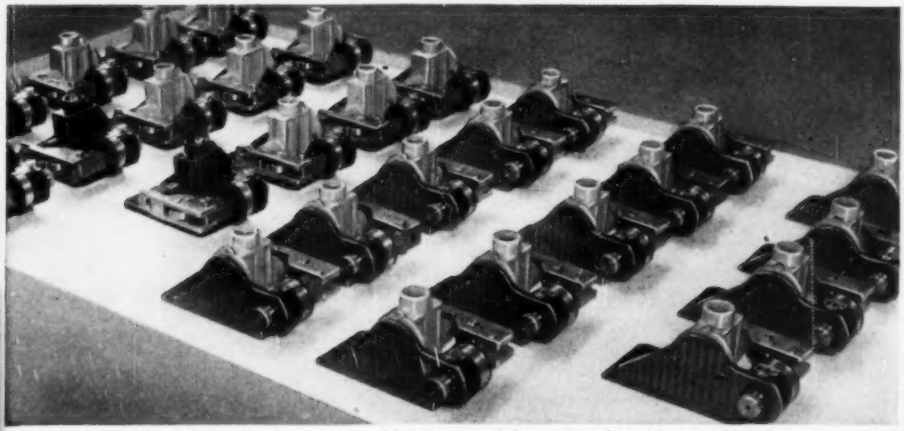

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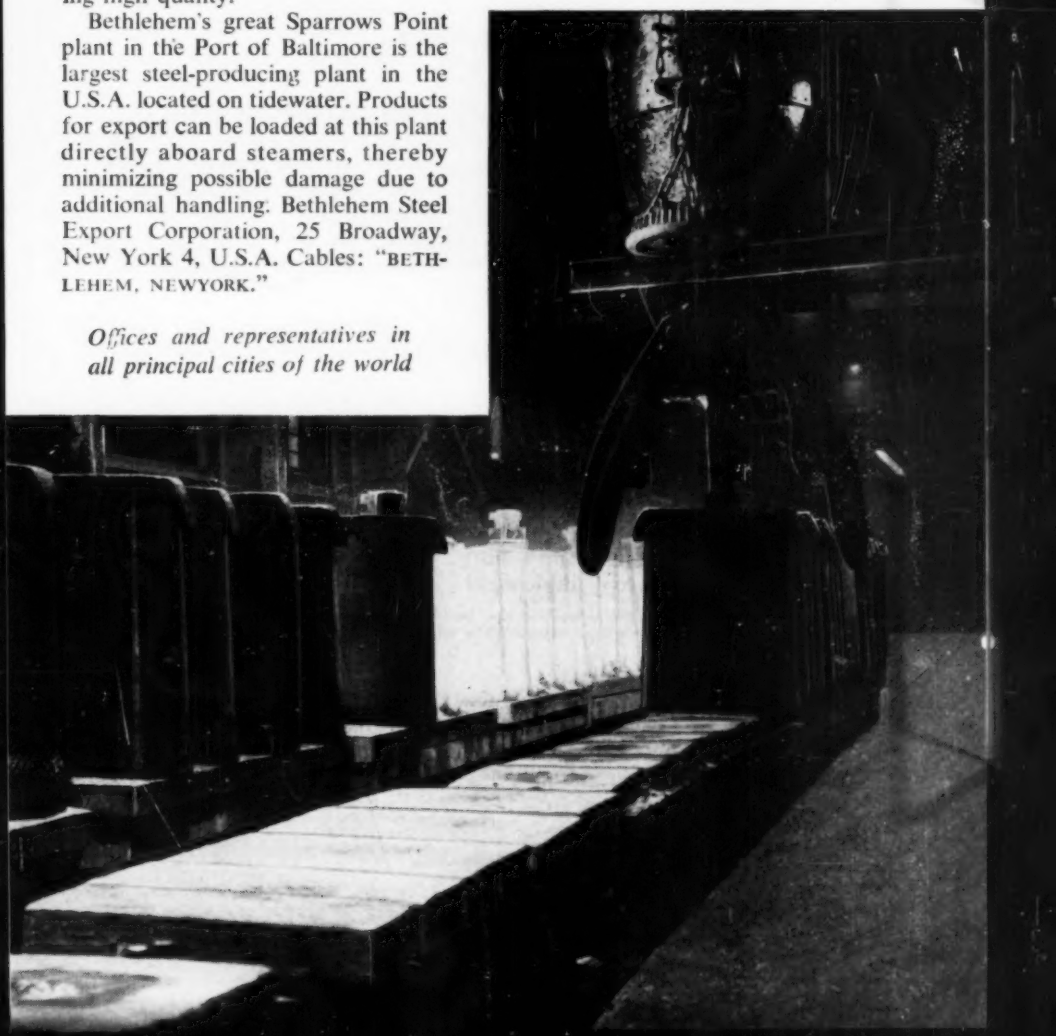

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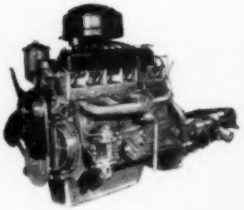

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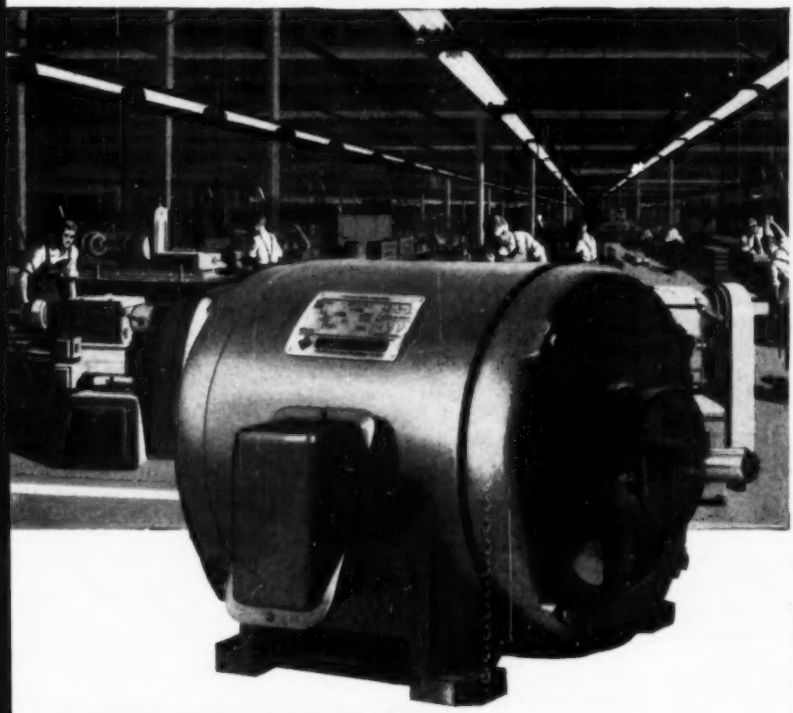

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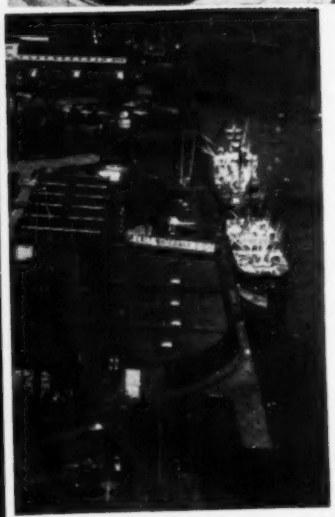

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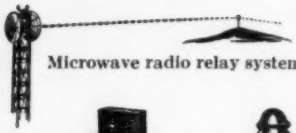

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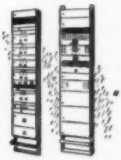

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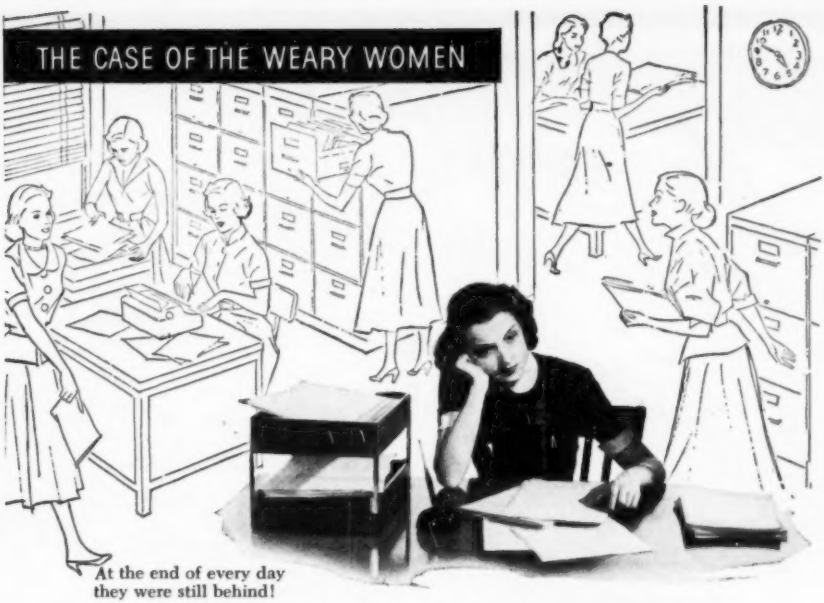

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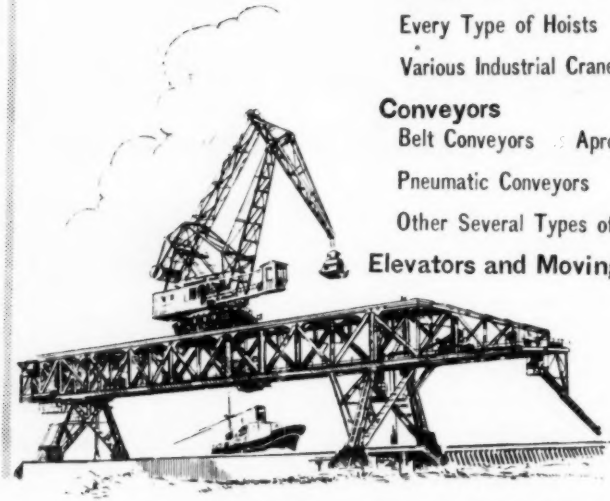

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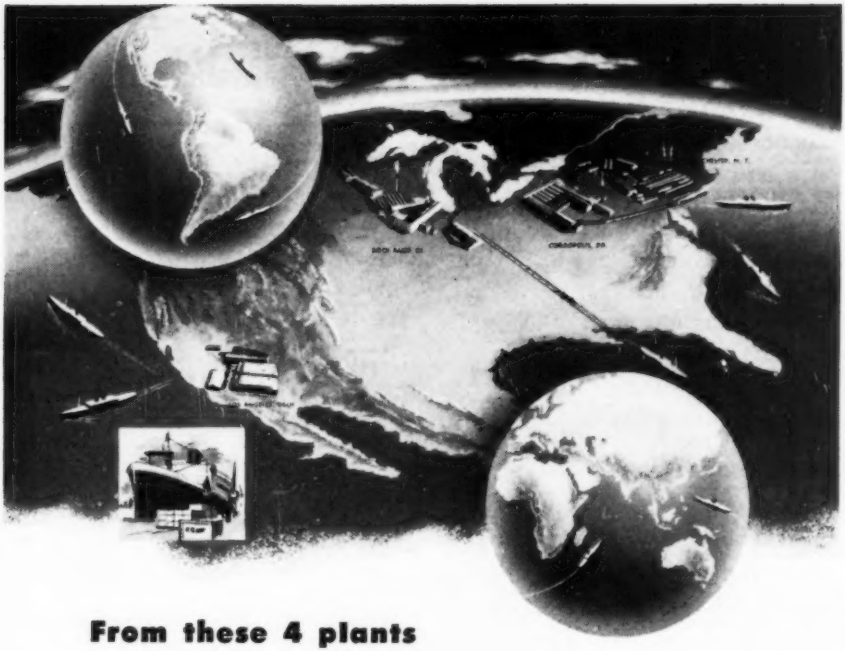

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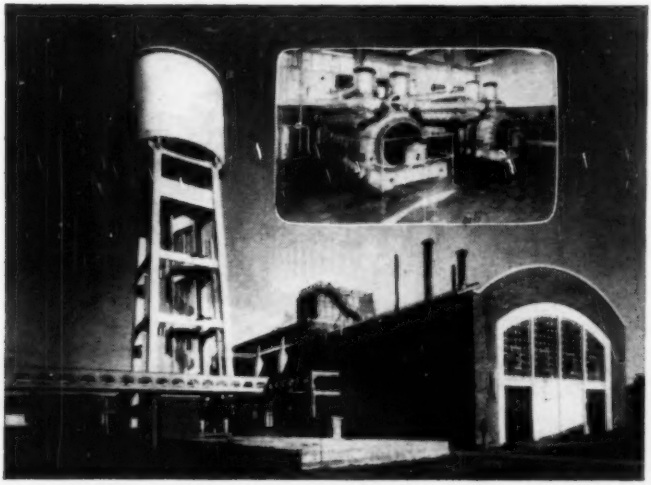

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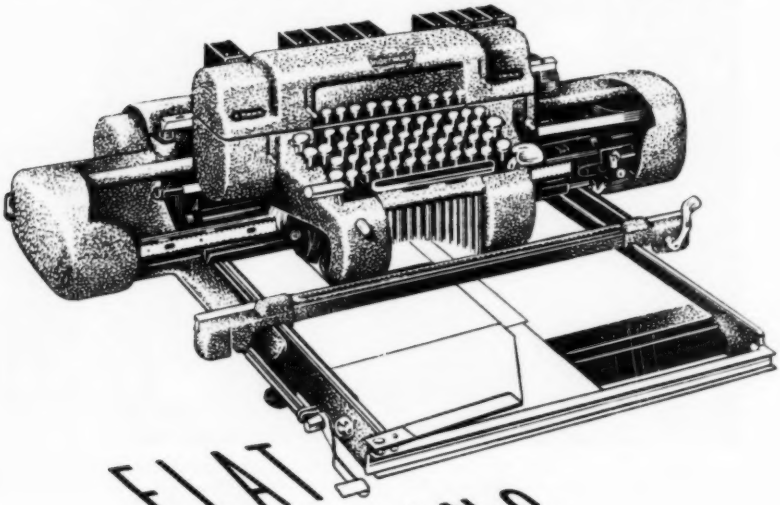

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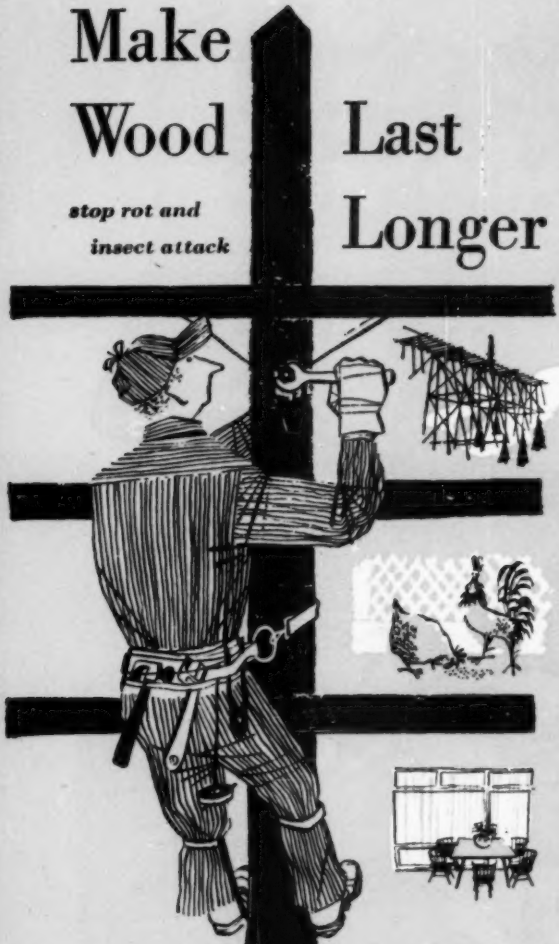

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